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American Scarlet Tanager, with a female (below) and immature males (above).

THE UNITED EDITORS PERPETUAL ENCYCLOPEDIA

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OF THE

ENGLISH LANGUAGE

MANAGING EDITOR

GEORGE EDWIN RINES

ASSISTED BY MORE THAN FIVE HUNDRED OF THE MOST EMINENT SCHOLARS AND SPECIALISTS

THIRTY VOLUMES

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No. 1.

SCHEME OF SOUND SYMBOLS

FOR THE PRONUNCIATION OF WORDS.

Note.—(-) is the mark dividing words respelt phonetically into syllables; (′), the accent indicating on which syllable or syllables the accent or stress of the voice is to be placed.

Sound-symbols employed in Respelling.	Representing the Sounds as exemplified in the Words.	Words respelt with Sound-symbols and Marks for Pronunciation.
ā	mate, fate, fail, aye	*māt, fāt, fāl, ā.*
ă	mat, fat	*măt, făt.*
â	far, calm, father	*fâr, kâm, fâ′thėr.*
ä	care, fair	*cär, fär.*
aw	fall, laud, law	*fawl, lawd, law.*
ē	mete, meat, feet, free	*mēt, mēt, fēt, frē.*
ĕ	met, bed	*mĕt, bĕd.*
ė	her, stir, heard, cur	*hėr, stėr, hėrd, kėr.*
ī	pine, ply, height	*pīn, plī, hīt.*
ĭ	pin, nymph, ability	*pĭn, nĭmf, ă-bĭl′ĭ-tĭ.*
ō	note, toll, soul	*nōt, tōl, sōl.*
ŏ	not, plot	*nŏt, plŏt.*
ô	move, smooth	*môv, smôth.*
ö	Goethe (similar to *e* in her)	*gö′tėh.*
ow	noun, bough, cow	*nown, bow, kow.*
oy	boy, boil	*boy, boyl.*
ū	pure, dew, few	*pūr, dū, fū.*
ŭ	bud, come, tough	*bŭd, kŭm, tŭf.*
û	full, push, good	*fûl, pûsh, gûd.*
ü	French plume, Scotch guid	*plüm, güd.*
ch	chair, match	*chär, măch.*
ċh	German buch, Heidelberg, Scotch loch (guttural)	*bo͝ċh, hī′dėl-bĕrċh, lo͝ċh.*
g	game, go, gun	*gām, gō, gŭn.*
j	judge, gem, gin	*jŭj, jĕm, jĭn.*
k	king, cat, cot, cut	*kĭng, kăt, kŏt, kŭt.*
s	sit, scene, cell, city, cypress	*sĭt, sēn, sĕl, sĭt′ĭ, sī′prĕs.*
sh	shun, ambition	*shŭn, ăm-bĭsh′ŭn.*
th	thing, breath	*thĭng, brĕth.*
t͟h	though, breathe	*t͟hō, brēt͟h.*
z	zeal, maze, muse	*zēl, māz, mūz.*
zh	azure, vision	*ăzh′ėr, vĭzh′ŭn.*

GREASE-WOOD, *grēs-wûd:* plant of the order *Chenopodiaceæ*, very abundant in the far w., and known botanically as the *Sarcobatus vermiculatus*. It forms a noticeable feature of numerous barren regions that are heavily charged with alkaline salts.

GREAT, a. *grāt* [Dut. *groot;* Ger. *gross*]: large or considerable in bulk, dimensions, or number; weighty; adorable; marvellous; principal; having rank or power; illustrious; eminent; of a high and noble character; expressing an extension or unusual degree of a thing; pregnant; a word used in the more remote steps of consanguinity, either ascending or descending, as *great* grandfather; hard, difficult, or grievous. GREAT'LY, ad. *-lĭ*. GREAT'NESS, n. largeness; extent; high degree, rank, or place; eminence; elevation of sentiment; magnificence; grandeur. GREAT-COAT, an overcoat. A GREAT WHILE, a long time. THE GREAT, people of rank or distinction. GREAT-HEARTED, noble; undejected. GREAT CIRCLES: see under CIRCLE. GREAT GO, the familiar slang term for a university examination for a degree, the preliminary or previous examination being termed the LITTLE GO. BY THE GREAT, in the gross or whole. *Note.*—The applications of GREAT are very numerous, and it often imparts merely an intensive or emphatic meaning to a noun.—SYN. of 'great': important; considerable; chief; venerable; wonderful; general; noble; excellent; magnanimous; generous; high-minded; opulent; sumptuous; magnificent; swelling; proud; big; grievous; grand;—of 'greatly': much; considerably; magnificently; nobly; illustriously;—of 'greatness': bulk; size; magnitude; elevation; dignity; distinction; power; command; pomp; magnanimity; nobleness; force; intensity.

GREAT BARRINGTON, *grāt bär'ĭng-ton*, Mass., town in Berkshire co., on the New York, New Haven & Hartford railroad, 40 m. w. of Holyoke. The town was settled in 1725, but formed a part of Sheffield until 1761, and it now embraces the three villages of Great Barrington, Housatonic, and Van Deusen. It has a public library, the Hopkins Memorial Manse, the Sedgwick Institute, and a number of good elementary schools. There are also manufactories of cotton goods, electrical apparatus, and paper. William Cullen Bryant resided here in his youth, was town clerk for several years, and the fine imagery of many of his poems was inspired by the beauty of the Berkshire scenery. Pop. (1910) 5,926.

GREAT BA'SIN, formerly known as Fremont's Basin; a vast triangular plateau of interior drainage, occupying the western part of Utah, nearly the whole of Nevada, and parts of Oregon and California, and extending at its northern angle into Idaho. Its dimensions from north to south are about 800 miles, with a width from east to west of 500 miles, covering an area of

210,000 square miles, a little larger than France. It is traversed by numerous irregular mountain ranges, the valleys in general being sinks, with the chief drainage centre at Great Salt Lake (q.v.). A singular feature of the basin is the fact that the greatest areas of depression are found near the border, and the greatest elevation near the central part. The East Humboldt mountains form the highest range, one peak of which, Mount Bonpland, is 11,321 ft. above sea level. Volcanic masses form or conceal the original rocks of many of the ranges. The slopes and the geological markings show that the lakes and rivers which once existed within this region have gradually grown smaller and some have entirely disappeared. The Columbia river once had its sources here; but at present there are many streams of water and lakes (for the most part salt) whose waters never reach the ocean, their contents either sinking into the desert sands or being taken up by evaporation. The mean annual rainfall averages in different localities from 4 to 15 inches; the plateau is nearly destitute of trees, as a rule only the upper parts of the valleys being clothed with desert shrubs, their lower portions being often covered with muddy water or several inches of alkaline salts left by evaporation. The chief arid places are the Great Salt Lake Desert, the Mohave Desert, and the Carson Desert. This basin is rich in mineral wealth; gold, silver, iron ore, and copper exist here in large quantities. The Great Basin is among the large interior drainage sections of the world; but the interior drainage basin of Asia is 23 times as great, and the Sahara 16 times as great.

GREAT BEND, Kansas, city, and cap. of Barton co., on the Missouri-Pacific, the Arkansas river, and the Atchinson Topeka & Santa Fé railroads, about 92 m. w. of Wichita. The Central Normal College of the state is located here, it is a trade centre for the surrounding agricultural region, and has flour mills and iron works. Pop. 2,500.

GREAT BEAR LAKE. See Bear Lake, Great.

GREAT BRIDGE, Va., Battle at: 1775, Dec. 9. Lord Dunmore, royal governor of Virginia, hearing that a patriot force from North Carolina was on the way to occupy Norfolk, the largest town in Virginia and its chief port, built a rough fort at Great Bridge, over the Elizabeth River, commanding the southern approach. The Virginia patriots raised a band of sharpshooters, including John Marshall, afterward Chief Justice of the United States Supreme Court, took possession of the opposite bank, and in a 15-minute fight, which cost Dunmore 61 regulars and the militia none, forced him to abandon the fort. A few days later the Virginians occupied Norfolk, which the spiteful governor set on fire before taking refuge in a war-ship in the harbor. The town was reduced to ashes.

GREAT BRITAIN.

GREAT BRITAIN, *brit'an:* recognized designation, from the time of James I. of the Island comprising England and Scotland; formal designation since the union of the two kingdoms, 1707. The official designation of the kingdom in its political unity since 1801, Jan 1, THE UNITED KINGDOM OF GREAT BRITAIN AND IRELAND. The geology and geography of the island of Great Britain are given here; also general statistics of the United Kingdom of Great Britain and Ireland. For historical sketches of England and Scotland before the union of the two kingdoms, see ENGLAND; SCOTLAND: for the history of Ireland previous to its union with Great Britain, see IRELAND (also for its geography).

THE ISLAND OF GREAT BRITAIN—so called to distinguish it from Britannia Minor, or Little Britain (see BRENTAGNE) in France—lies between lat. 49° 57′ 30″ and 58° 40′ 24″ n., and between long. 1° 46′ e. and 6° 13′ w.; largest island in Europe. It is bounded n. by the Atlantic, e. by the North Sea, s. by the English Channel, w. by the Atlantic, the Irish Sea, and St. George's Channel. The most northerly point is Dunnet Head, in Caithness; the most southerly, Lizard Point, in Cornwall; the most easterly, Lowestoft Ness, in Suffolk; and the most westerly, Ardnamurchan Point, in Argyleshire: greatest length about 608 m., and greatest breadth (from Land's End to the e. coast of Kent) about 320 m.; about 89,600 sq. miles.

Geology.—The geology of Great Britain is of peculiar importance. The rocks of the earth's crust having been first systematically studied and expounded here, British geologists have given to the world the names whereby the various strata are known and British rocks form the typical series of the earth's strata. The whole recognized series of stratified deposits occur in Britain, one or two only being more fully developed elsewhere; and it is only in these singular cases that the foreign equivalents are taken as the types. British geology is no less important from its influence in the development of the country. The mineral wealth, especially the coal and the iron, are the real sinews and muscles of Britain's power. No other country has developed similar advantages in so compact an area.

Following the order of the strata, beginning with the lowest and oldest, it may be said that, in general, the mountainous regions of the n. and w. are formed of the oldest sedimentary rocks, and that, as we move s.-eastward, we gradually pass over newer strata, until, in the e. of England, we come to the only extensive Pleistocene deposits in the country.

The base rocks of the whole series occur in the outer Hebrides, in Tiree and Coll, and along the w. shores of Sutherland and Ross. The true position of these strata has been only recently determined by Murchison

and Geikie, who, noticing that their strike was at right angles to the beds resting above them, discovered that they were older than the superimposed Cambrian rocks. They consider them the equivalents of the *Laurentian system*, described by Sir. W. Logan in Canada. The predominant rock is crystalline gneiss. A band of limestone occurs on the n.e. shore of Loch Maree, but this has hitherto proved unfossiliferous.

Resting on the convoluted edges of this old gneiss, on the mainland, and forming the basement rocks in Cumberland, Anglesey, and N. Wales, are the *Cambrian series* of deposits. In Scotland, these rocks are brownish-red sandstones and conglomerates; in England and Wales, they are sandstones, gritstones, and slates. A few fossils, chiefly impressions of supposed fucoid plants, annelid tracks, and zoophytes, have been found in the slates.

The *Silurian measures* occupy a large portion of the surface. The typical rocks occur in Wales, extending over the w. portion of the principality from Pembroke to Denbigh, and including the n. portions of Pembroke, Caemarthen, and Brecknock, the whole of Radnor and Montgomery, the s.w. of Denbigh, and the whole of the counties to the west. The oldest or Lower Silurian beds are next the coast. The series consists of an immense thickness of shales, slates, and sandstones, with intercalated limestones more or less pure. Immense tracts have hitherto proved devoid of fossils; in other districts, the calcareous rocks are almost entirely composed of the remains of marine invertebrate animals, while the shales abound in zoophytes and crustacea. The high lands in n. Lancashire and s. Westmoreland are Silurian; but it is in Scotland that these strata are most extensive; indeed, almost the whole country consists of Silurian strata, with the exception of a large trough in the centre, occupied by newer rocks. A line drawn from Dunbar to Girvan forms the n. limits of these beds in s. Scotland. Except the lower half of the valley of the Tweed, the whole region from this line to near the base of the Cheviots is Silurian. The rocks are chiefly graywacke, with scattered beds of impure limestone. The chief fossils are graptolites, crustacea, and mollusca. The lead-mines of Wanlockhead and Leadhills are in this district. The line drawn from Stonehaven to Helensburgh would mark the termination of the Silurian strata, which compose the whole of n. Scotland, with the exception of the newer beds on the n.e. coast, and the Laurentian and Cambrian series above described. All the series is greatly metamorphosed; the lower strata are converted into quartzose flagstones and quartz rock, the upper into chlorite and mica-slate, and quartzose and gneissose rocks.

The *Old Red Sandstone strata*, consisting of con-

MAP OF THE
BRITISH ISLES
SCALE OF MILES
0 25 50 75 100
SHETLAND ISLANDS
Lerwick
Sumburgh Hd.
FAIR I.
ORKNEY ISLANDS
Kirkwall
Stromness
Dunnet Hd.
Pentland Firth
Wick
Cape Wrath
Butt of Lewis
Stornoway
FLANNAN IS. OR 7 HUNTERS
BORERA
ST. KILDA
OUTER HEBRIDES
Gulf of the Hebrides
BARRA
TIREE
COLONSAY
SUTHERLAND
Dornoch Firth
Moray Firth
Banff
Buchan Ness
Aberdeen
Stonehaven
KINCARDINE
Montrose
FORFAR
Dundee
Firth of Tay
PERTH
Firth of Forth
Edinburgh
Glasgow
Kilmarnock
Ayr
ARRAN
Berwick
Wooler
Alnwick
NORTHUMBERLAND
Newcastle
Sunderland
DUMFRIES
Dumfries
Solway Firth
Mull of Galloway
Luce Bay
NORTH CHANNEL
Giants Causeway
Malin Head
Lough Swilly
TORY I.
Bloody Foreland
ARAN I.
Gweebarra Bay
Malinmore Hd
Donegal Bay
Killala Bay
The Mullet
Sligo
Omagh
Belfast
Downpatrick
Dundalk
Dublin
Wicklow
Galway
Galway Bay
ARAN IS.
Ennis
R. Shannon
Limerick
Tralee
Kilkenny
Wexford
Carnsore Pt.
Youghal
Cork Harbor
Bantry
Cape Clear
ISLE OF MAN
Douglas
Castletown
IRISH SEA
Liverpool
Birkenhead
Preston
Manchester
Sheffield
Leeds
Bradford
York
Hull
Scarborough
Flamborough Head
Spurn Head
Middlesborough
Richmond
Northallerton
Ripon
DURHAM
Durham
Stockton
Carlisle
Kendal
Lincoln
Boston
The Wash
NORFOLK
Norwich
Gr. Yarmouth
Thetford
SUFFOLK
Ipswich
Cambridge
Colchester
Chelmsford
Harwich
London
Thames R.
Canterbury
Dover
KENT
Hastings
Brighton
Beachy Head
SUSSEX
Chichester
Portsmouth
Guildford
Croydon
SURREY
Reading
Winchester
Southampton
HAMPSHIRE
ISLE OF WIGHT
St. Catharines Pt.
Salisbury
DORSET
Dorchester
Portland Bill
St. Albans Hd.
Lyme Bay
Exeter
DEVON
Plymouth
Dartmouth
Start Pt.
CORNWALL
Penzance
Lands End
Lizard Head
SCILLY IS.
ST. MARY
Barnstaple Bay
Bude Bay
LUNDY I.
BRISTOL CHANNEL
Bristol
Birmingham
Coventry
Leicester
Northampton
Bedford
Oxford
Worcester
Hereford
Gloucester
Cheltenham
Shrewsbury
Stafford
Derby
Chester
Stockport
CHESHIRE
Cardigan Bay
BARDSEY I.
ANGLESEY
Holyhead
Carnarvon
Pembroke
Carmarthen Bay
St. Davids Head
ST. GEORGES CHANNEL
ENGLISH CHANNEL
Strait of Dover
Boulogne
Dieppe
Havre
FRANCE
CHANNEL ISLANDS
NORTH SEA
ATLANTIC OCEAN
Copyright, 1907, by United Editors Association
Longitude West from Greenwich

glomerates, coarse and fine grained sandstones, and dark-colored schists, with the characteristic fossils of ganoid and placoid fish, overlie the Silurians in several districts in Scotland. Nearly all Caithness and the seaward portions of Sutherland, Ross, Comarty, Inverness, Nairn, and Moray, belong to these strata. A broad band, rising on the e. coast between Stonehaven and St. Andrews, stretches across the country to Helensburgh and Dumbarton on the west. The same strata appear again in Haddington, Berwick, and Roxburgh, in Lanark, and in Ayreshire. An extensive tract of these strata occurs in S. Wales and the neighboring English counties, extending from the Silurian district to the Severn and the Bristol Channel, and containing in a large basin the s. Wales coal-field. The highly fossiliferous strata of n. Devon, and of s. Devon and Cornwall, belong to this period. They consist of slates, sandstones, and limestones, and contain numerous corals and shell-fish.

The strata of the *Carboniferous period* may be said to occupy a broad tract extending from the Bristol Channel to the base of the Cheviots. They are not continuous between these limits, but are broken up in some places by the appearance on the surface of older strata, while in others they are covered by newer deposits. The various detached coal-fields are: (1) s. Wales, in Glamorgan and Pembroke; (2) Bristol, and (3) Forest of Dean, in Gloucester; (4) Forest of Wyre, in Worcester; (5) Shrewsbury, and (6) Colebrook Dale, in Shropshire; (7) North and (8) South Staffordshire; (9) Warwickshire; (10) Leicestershire; (11) Flint and Denbigh; (12) Lancashire; (13) York and Derby; (14) Cumberland; and (15) Northumberland and Durham. In the n. portion of this great tract of coal-measures, where the millstone grit and carboniferous limestone are largely developed, no seams of coal of any value are contained. The limestone in Derby is rich in metallic ores. The carboniferous strata of n. England extend beyond the Cheviots into Scotland, forming a narrow band from the Solway to the North Sea, in the counties of Dumfries, Roxburgh, and Berwick. The only coal-field in this district is one of small extent at Canonbie, in Dumfriesshire. The carboniferous strata in Scotland, with the exception just stated, are confined to the immense trough between the Silurian measures on the s. and the Old Red Sandstone on the n., which is completely occupied by them, except where the Old Red Sandstone rises to the surface. Considerable tracts of sandstone and limestone without coal break up the true coal-bearing measures into the following coal-fields: the Mid-Lothian, the Fife, the Lanark and Stirling, and the Old Cumnock, in Ayrshire. Beside coal, the whole of the carboniferous series contain immense stores of argillaceous car-

bonate of iron, the ore from which is produced the great bulk of the iron used in the country. The sandstones of this period form beautiful and durable building-stones, the limestones are of great commercial value, and many of the less indurated shales are good fire-clays.

Permian strata, consisting of magnesian limestone and sandstone colored with oxide of iron, occupy a considerable area in Durham, and border the carboniferous rocks in Dumfries, Cumberland, Westmoreland, Lancashire, Cheshire, Shropshire, Stafford, Worcester, Warwick, Nottingham, and York, and in Glamorgan. The sandstone is quarried for building.

The typical triple series of the *Triassic measures* occur in Germany; the British representatives consist of variously colored sandstones and marls. They occupy a considerable surface in Lancashire, Cheshire, Shropshire, and Stafford, and extend, as a ribbon of varying breadth, from the mouth of the Exe, through Devon, Somerset, Gloucester, Worcester, Warwick, Leicester, Nottingham, York, and Durham, to the coast at Hartlepool. The only deposits of rock-salt in Britain occur in the triassic rocks of Cheshire and Worcestershire.

The *Lias* consists of white sandstones, limestones, shales, marls, and alum slates. They abound in fossils, especially in the remains of reptiles, fishes, mollusca, and encrinites. The strata of this age occupy a band between the Trias and the Oolite, extending from Lime Regis to the mouth of the Tees. Two small tracts of lias occur, one in Glamorgan, and the other in Shropshire. In Scotland, small patches are at Brora in Sutherland, and in the islands of Skye, Eigg, and Mull.

The *Oolite measures* are composed of an extensive series of limestones, sandstones, and shales, which occupy a belt nearly 30 m. broad from Yorkshire to Dorsetshire, passing through Lincoln, Northampton, Huntingdon, Bedford, Buckingham, Oxford, and Wilts. The best building-materials in England are obtained from these strata. Oolite strata occur in Scotland at Brora and in Skye. In the Brora Oolite, a seam of coal 3½ ft. in thickness has been worked for more than a century: it is the thickest bed of pure vegetable matter detected in any Secondary formation in Britain.

The fresh-water *Wealden series*, with their abundant remains of reptiles, fishes, shells, and insects, occur in Kent and Sussex, in the Isle of Wight, and in s. Devon.

The beds of the *Cretaceous period*, consisting chiefly of chalk with intercalated sands and clays, all very rich in fossil remains, occupy a broad tract e. of the Oolite strata, and parallel to them. Beginning a little n. of Flamborough Head, they may be traced through

York and Lincoln, then across the Wash into Norfolk, Suffolk, Hertford, Buckingham, Oxford, Berks, to Hampshire, where they separate into three arms, one extending s.w. through Wilts and Dorset to the s. coast; another s.e. to Beachy Head; the third stretching as a narrow band e. through Surrey and n. Kent, widening out as it nears the coast, where it occupies the district between Ramsgate and Folkstone.

Eocene strata, consisting of clays, sands, and marls, abounding in fossils which indicate a sub-tropical climate, occupy the valley of the Thames from Hungerford to the sea, and from Canterbury to Saxmundham, as well as a large district in Dorset, Hants, and Sussex, from Salisbury w. to Dorchester and e. almost to Hastings.

Unless the beds in Mull, containing the numerous impressions of exogenous plants, are *Miocene strata*, there are no representatives of this period in Britain.

The *Pliocene* deposits of ferruginious shelly sand and marl known as red crag occur chiefly in Suffolk. The still more recent *Pleistocene deposits* of freshwater sand and gravel and mammaliferous crag are found on the coasts of Norfolk, Suffolk, Essex, and Kent. The till and glacial beds of the same age are scattered as superficial deposits over large districts. Fossiliferous beds of this age occur in Caithness, in the valley of the Clyde, and in Lancashire; they contain remains of mollusca, many of which still live in the seas of boreal America.

Minerals—Coal.—The greatly increasing consumption of coal has originated fears as to the possibility of the exhaustion of the mineral fuel. It appears that in 1820, only 15,000,000 tons were raised; in 1840, the amount was 30,000,000; and in 1860, nearly 84,000,000. The consumption during the last years of the 19th century would, at the increasing ratio of recent years, amount to above 1,460 million tons a year, a quantity vastly greater than can possibly be used. The output of coal (1905) was 236,128,936 tons, valued at $410,692,765.

Iron.—Formerly, the only iron produced in the country was obtained from the greensand of the s.e. of England, and from the brown hematite of the Dean Forest. The ore was smelted with charcoal. But the introduction of coke and coal for smelting, and the discovery of numerous additional and unexpected deposits, especially in connection with coal-bearing strata, has immensely increased the production of iron, and met the greatly increased demands for this metal. In 1760, when charcoal alone was used for smelting, not more than 25,000 tons of iron were produced; in 1860, no less than 3,826,752 tons were obtained from 8,024,206 tons of ore. The market value of the metal was $61,741,197. In 1905 the total iron ore production of

United Kingdom amounted to 14,590,703 tons, value $17,410,920. The most important ore is the ferruginous shale, or impure argillaceous carbonate of iron, which occurs in connection with every coal-field of Britain. The brown and red hematite, associated with the oldest palæozoic rocks, yield also a large amount of metallic iron.

Tin is obtained from only two counties—Cornwall and Devon. In 1905 the product of metallic tin was 7,201 tons, value $2,870,915.

Copper is obtained principally from the same two countries. There are about 65 different mines, which produced (1880) 52,118 tons of ore, yielding 3,662 tons of metallic copper, value $1,230,926; and (1905) 6,903, tons of ore, value $108,980. In 1860 there was a yield of 13,789 tons of ore, producing 935 tons of metal, value £100,691 chiefly from the counties of Lancaster, Caermarthen, and Anglesey, small quantities being supplied from Cumberland, Chester, Cardigan, and Isle of Man.

Lead and *Silver* are obtained from the same ore from numerous mines in Palæozoic districts. The most productive English mines are in Northumberland, Durham, Cumberland, York, and Derby, in Shropshire, and in Cornwall and Devon. Small quantities are obtained in Somerset, Westmoreland, Stafford, and Chester. All the Silurian counties of Wales contain mines. The Isle of Man yields nearly 3,000 tons of ore. In Scotland, the most productive mines are at Wanlockhead and Leadhills; Argyll, Perth, and Kirkcudbright supply small quantities. The value of lead ore, 1901, was $1,223,760.

Zinc is obtained from Cornwall and Devon, Cardigan and n. Wales, Derby, Cumberland, and the Isle of Man. The product, 1905, was 23.909 tons, value $699,-030.

Sulphur ores (iron pyrites) were raised in different parts of Great Britain, chiefly in Cornwall, to the extent of (1905) 12,186 tons, value $23,945.

The following minerals also are raised in Cornwall, viz., arsenic, manganese, gossan, nickel, silver-copper, fluorspar, and wolfram.

Salt occurs in Cheshire, Worcestershire, Staffordshire, and Ireland: product in 1905, 1,889,910 tons, value $2,782,185.

The mineral products of Great Britain amounted in value at the mines (1905) $479,353,615.

Physical Geography.—The physical features of a country are intimately connected with its geological structure. The older Palæozoic rocks produce mountainous regions, intersected with deep and narrow valleys. The newer strata seldom rise to a great height. Their high lands are rounded undulations of the strata, except where igneous rocks are intruded, and the val-

leys are broad and shallow. In Scotland are consequently two extensive mountainous districts, occupied chiefly with rocks of Silurian age, and an intervening valley filled with Old Red Sandstone and Carboniferous measures. The n. mountain region is intersected by the Great Glen, which is a fissured anticlinal axis in the Silurian strata. It is difficult to group the mountains in this district. The Grampians from Aberdeen to Argyle show the most marked linear arrangement: the greatest eminence in this range is Ben Lawers (3,948 ft.). Between the Grampians and the Great Glen, a succession of great eminences occurs, the highest of which, and the culminating point of all the British Isles, is Ben Nevis (4,406 ft.). N. of the valley of the Caledonian canal, the region is a confused mass of mountains, reaching, in Ben Attow, 4,000 ft. Caithness consists of plains of undulating sandstone, covered with drift; the headlands and sea-cliffs in this county are bold and striking. The coast-line of the Palæozoic region of n. Scotland is repeatedly broken by numerous and large friths or sea-lochs, and the interior abounds in picturesque lakes. The Silurians of s. Scotland form an extensive mountain range crossing the island from St. Abb's Head to Stranraer. The rocks are less indurated than in the n.; the scenery is consequently not so wild. The mountains have generally broad, flattened forms, intersected by deep pastoral glens, which widen out into broader valleys and dales. The principal heights are Hartfell (2,790 ft.) and Black Larg (2,890 ft.). The great central valley of Scotland embraces the basins of the Clyde, Forth, and Tay. It contains several tracts of rich table-land and is frequently broken through by igneous rocks, chiefly trappean, which project into bold and picturesque hills.

England and Wales, in the Cambrian and Silurian districts, have the same mountainous character as similar districts in Scotland; but as so much of England is occupied with newer strata, it may be considered on the whole a level country, traversed by ridges of varying elevation, which form the watersheds. The range, beginning with the Cheviot Hills, is continued from the borders of Scotland southward, as the Pennine range, through Northumberland, Cumberland, Westmoreland, Lancashire, and Yorkshire, to the middle of Derbyshire; it varies in height from 1,200 to 3,000 ft., reaching its highest summit, in Crossfell, Cumberland, 2,929 ft. The band of Lais and Oolite, from Yorkshire to Dorset, forms a tortuous range of table-land, rising sometimes into hills to the height of 1,500 ft., and throughout its course presenting generally a bold escarpment to the w., and having a gentle slope to the east. W. of this range of table-land, are the valleys of the Yorkshire Ouse, the Trent,

and the Severn; on the e., the Great Ouse and the upper portion of the Thames. Beyond these two rivers, the country rises into a range of low chalk-hills, which follow the cretaceous strata from Norfolk to Wilts, dividing with the strata into three ranges, two of which take an easterly direction through Sussex and Surrey and Kent, bordering the Wealden strata, and forming the South and North Downs. Devon and Cornwall are mountainous, from the intrusion of granite and other igneous rocks through the Palæozoic strata.

For the details of the physical geography, see titles of the several counties, lakes, rivers, etc.

Climate.—The climate of Great Britain derives its peculiar character from its insular situation, in connection with the prevailing direction of the winds. It is mild and equable in a remarkable degree, the winters being considerably warmer and the summers cooler than at places within the same parallels of latitude. For at least three months, the mean monthly temperature ranges between 50°·0 and 60°·0; for another three months it continues about 60°·0, or occasionally a little higher, seldom more than three degrees; and for the remaining six months it ordinarily ranges between 36°·0 and 48°·0. Since the reports of the registrar-general clearly prove that the temperature most conducive to health is between 50°.0 and 60°.0, it follows that, as far as concerns temperature, the climate of Great Britain is one of the healthiest in the world.

As appears from data in Reports of the English and Scottish Meteorological Societies, the mean temperature of England is 49°·5, of Scotland 47°·5. The mean temperatures of the following places arranged according to the latitudes, have been deduced from the same sources; Guernsey 50°·2; Truro 51°·3; Ventnor 51°·5· Barnstaple 50°·8· Aldershott 49°·4; Greenwich 49°·5; Bedford 49°·3; Derby 48°·8; Liverpool 48°·9; Manchester 48°·0; Isle of Man 47°·8; Scarborough 47°·0; Milne-Graden (Berwick) 46°·8; Dalkeith 46°·9; Rothesay 47°·8; Greenock 47°·9; Arbroath 46°·6; Culloden 46°·8; Tongue 46°·5; Sandwick (Orkney) 45°·6; and Bressay (Shetland) 45°·3. There is thus a difference of fully six degrees between Ventnor, in the Isle of Wight, and Shetland. As this difference is attributable chiefly to the difference of their latitudes, it follows that it will become greater as the force of the sun's rays increases; and hence, while the winter temperatures are respectively 42°·2 and 39°·5; the summer temperatures are 61°·8 and 53°·4. An approximately regular decrease of temperature with an increase of latitude will be observed, particularly if the places on the w. side of the island be regarded as a distinct series by themselves. It will appear, on examination, that the temperatures of places on the w. are about a degree in excess of those of places in the same latitudes

but at some distance from the Atlantic. In winter, the difference between the w. and the other parts of the country is still greater. Thus, while the winter temperature at Truro is 45°·0, Guernsey 43°·8, Ventnor and Barnstaple 42°·2, Isle of Man 41°·8, Liverpool 40°·6, and Greenock and the whole of the w. coast of Scotland as far as Shetland 39°·5,—that of Greenwich is 37°·9; Nottingham 37°·3; York 37°·1; Scarborough 38°·8; Dalkeith 37°·0; Arbroath 37°·1; and Culloden 38°·2.

The s.w. winds are the most prevalent throughout the year, except in April and May, when they give place to the n.e. winds. The notoriously dry and parching character of the latter render them very deleterious to health. On the other hand, the s.w. winds, coming from the Atlantic, are moist and genial, and it is on their greater frequency—being, as compared with the n.e., in the proportion of two to one—that the salubrity of the climate in great measure depends.

In those districts of England where hills do not interfere, the annual rainfall is about 25 inches, and in similar parts of Scotland about 28 inches; but these amounts, which may be considered as the minimum, are variously increased by proximity to hills, according as the place is in the e. or w. of the island, viewed in relation to the direction of the wind which brings the rain, and by its lying to the wind or lee side of these hills. Since it is the s.w. winds which bring the rain, the heaviest falls take place among the hills in the w. of the country; and in the w. where there are hills lying to the n.w., w., or s.w., the annual rainfall is about the minimum. The annual rainfall in Cornwall, Wales, Cumberland, and the w. Highlands is estimated at 45 to 65 inches. In some places, however, this amount is far exceeded. At Seathwaite, in Cumberland, for instance, the rainfall is truly tropical, the mean annual amount being 127 inches; in 1861, it was 182 inches; and in the month of Nov. of that year the enormous quantity of 35·41 inches fell at this station. At Tyndrum, in Perthshire, 13·5 inches fell in 1861; and at this place, and among the Arrochar Hills, the monthly rainfall is occasionally between 20 and 30 inches.

Natural History.—The natural history of Great Britain corresponds generally with that of continental Europe (q.v.). Very few species, either of plants or animals, are peculiar to Great Britain. The flora of the greater part of the island most nearly resembles that of Germany; but in s. England there is, as might be expected, a closer correspondence with that of the n.w. of France; and some plants found in the Channel Islands and on the French coast appear nowhere in Britain but in the s.w. of England. The mountains of Wales, Cumberland, and Scotland have a vegetation

resembling that of Scandinavia more than that of the mountains of central or southern Europe. The case is much the same as to the fauna. There are, however, many remarkable instances both of plants and animals, which, from these apparent relations to continental Europe, might be expected in Great Britain, yet are not indigenous to it; e.g. among plants, the Norway spruce, and, among animals, the lemming, both common in Scandinavia. The progress of civilization and of cultivation has completely banished from Great Britain many animals formerly numerous: as, bears, wolves, etc. But on the contrary, many plants unquestionably introduced by man have become thoroughly naturalized.

Ethnology.—The present population of Great Britain is the result of successive waves of immigration. When the Romans invaded Britain (B.C. 54), the inhabitants were Celtic, mixed with an earlier Euskarian (Basque) non-Aryan element; and they continued mainly so until the 5th and 6th c. when—the Romans having retired—the level parts of the country were gradually overrun with German tribes. Then followed invasions of Danes and other Scandinavian nations, and lastly the Norman Conquest. As the Normans, however, were originally from Scandinavia, they cannot be considered as adding any new ethnological element; so that the inhabitants of England (excepting Wales), and of the Lowlands of Scotland, may be considered as sprung from an amalgamation of the original Celtic with German and Scandinavian blood, the latter having predominated so as to determine the language, institutions, and character of the resulting race. Wales and the Highlands of Scotland are still inhabited by representatives of the ancient Celtic tribes. See WELSH LANGUAGE AND LITERATURE; SCOTLAND; PICTS; IRELAND; CELTIC NATIONS; BRITANNIA; ANGLO-SAXONS.

Notwithstanding the union of the two kingdoms into which the island was once divided, the distinction for certain purposes is still kept up. England (including Wales), the larger and southern division, extends as far n. as the parallel of 55° 48′, the boundary-line running between Berwick-on-Tweed and the Solway Firth; greatest length is about 400, greatest breadth about 320 m.; about 58,300 sq. m. England resembles to some extent a triangle in shape, its s. shore forming the broad base, and its e. and w. coasts gradually approaching until the apex is reached at Berwick-on-Tweed. Scotland occupies the n. part of the island; greatest length (from the Mull of Galloway to Dunnet Head) about 287 m.; greatest breadth (from Peterhead to Ardnamurchan Point) about 182 m.; elsewhere, however, the breadth is much less. Between Alloa, on the Forth, and Dumbarton, on the Clyde, it

is only 33 m.; between the head of Loch Broom, on the w. coast, and of the Dornoch Firth, on the e., only 26 m.; and n. of Iverness, the average breadth does not exceed 70 m. The entire area is about 31,000 sq. m. The greater part of the surface of Scotland is irregularly distributed into mountain and valley, a very small proportion spreading into level plains. The e. coast forms a waving, continuous, and rarely broken line; but the western is extremely irregular, being deeply indented with bays and arms of the sea, and exhibiting steep promontories and mountainous islands. The whole country is physically divided into *Highlands* and *Lowlands*—the former comprehending the n.w., w., and central portions; the latter, generally speaking, the e. coast and the country s. of the Forth and Clyde.

Islands.—The island of Great Britain is surrounded by the Isle of Man, Anglesey, the Scilly Isles, the Isle of Wight, the outlying Channel Islands, the Shetland Isles, the Orkneys, and the Hebrides, each having generally a mainland encircled by small islands and rocks, bare or scantily covered, which sea-fowl inhabit, fishermen in their boats visit, and shepherds sometimes dwell in during summer. The coast against the North Sea has few islands, except Thanet, Sheppey, and some lowlands, isolated at high water. Coquet, Staples, Holy Island, May Island, Inchkeith, and Incheolm, are the only ones inhabited. The Orkneys and the Shetlands lie to the north. St. Michael, Looe, and the Isle of Wight, are the only islands off the s. coast, except those sometimes connected with the land, and the Channel Islands off the coast of Normandy. All the other islands lie on the w. coast extending from the Scilly Isles, through Anglesey and Man, to the Island of Lewis. According to the census of 1851, there were about 500 of these islands and rocks, of which only 175 were inhabited; but in 1861 a more careful enumeration was made, when it was ascertained that Scotland alone had 787, of which 186 were inhabited. The number belonging to England was not stated.

For administrative purposes, Great Britain, with its surrounding islands (excepting the Channel Islands and the Isle of Man, which are under peculiar jurisdiction), is divided into 84 counties or shires. The following tables exhibit their several areas and populations:

BRITISH EMPIRE.

Country.	Area in Square Miles.	Population enumerated or estimated 1901.
Great Britain and Ireland.....	120,986	43,370,331
Gibraltar	1⅞	25,572
Maltese Islands.....	117	184,742
Total, Europe.....	121,104⅞	43,580,645

GREAT BRITAIN.

BRITISH EMPIRE.

Country.	Area in Square Miles.	Population enumerated or estimated 1901.
Cyprus	3,584	237,022
Aden, Perim, etc	101	41,406
Socotra	1,382	12,000
Ceylon	25,333	3,740,562
British India, with Native States	1,766,642	294,361,056
Straits Settlements	1,542	595,792
Protected Malay State	24,951	678,595
Wei-Hai-Wei	2,857	150,000
North Borneo	31,000	200,000
Sarawak	41,000	500,000
Hong-Kong	32	446,217
Total, Asia	1,898,424	300,962,650
Mauritius	705	377,364
Cape Colony	276,995	2,409,804
Basutoland	10,293	348,848
Natal	29,434	1,108,754
Bechuanaland	386,200	120,776
Orange River Colony	48,326	385,045
Transvaal	113,642	1,354,200
Rhodesia	750,000	575,894
Central Africa Protectorate	42,227	3,000,500
East Africa Protectorate	200,000	2,500,000
Uganda	86,000	4,000,000
Somaliland	68,000	153,000
Zanzibar and Pemba	1,020	200,000
Nigeria	348,000	3,500,000
Gold Coast	120,000	1,500,000
Lagos	26,700	1,500,000
Gambia	3,700	163,718
Sierra Leone	34,000	1,100,000
St. Helena, Ascension and Tristan	100	4,248
Natal	35,372	1,100,000
Seychelles	148	19,200
Total, Africa*	2,580,862	56,921,351
Commonwealth of Australia	2,972,918	3,925,000
New Guinea	90,540	350,000
New Zealand	104,471	851,063
Fiji Islands	7,435	121,074
Other Pacific Islands	10,000	200,000
Total Oceanica	3,185,364	5,447,137
Dominion of Canada	3,653,946	5,371,315
Newfoundland and Labrador	162,200	220,615
British West Indies	10,308	1,353,413
British Honduras	7,562	39,688
Trinidad and Tobago	1,868	279,900
British Guiana	104,000	302,000
Falkland Islands	7,500	2,009
Total, America	3,947,384	7,568,940
Total British Empire	11,713,138	414,440,723

NOTE.— With Egypt (area 400,000 sq. miles and 9,750,000 population), and the Saudan (area 950,000 sq. miles and 1,870,000 population), which are practically British territories, this total would be increased and the British Empire total would be 13,063,138 sq. miles and 426,000,000 in population.

GREAT BRITAIN.

THE UNITED KINGDOM OF GREAT BRITAIN AND IRELAND is, since the union of Ireland, 1801, Jan. 1., the full official designation of the country generally known as Great Britain, Britain, or the United Kingdom. In addition to the home territories, Great Britain possesses a multitude of dependencies.

CENSUSES OF THE UNITED KINGDOM, 1821–1901.

	Area in English sq. miles,	Population according to Census of		
		1821.	1831.	1841.
GREAT BRITAIN—				
England	50,823	11,281,883	12,090,523	15,002,443
Wales	7,363	718,353	806,274	911,705
Scotland	30,417	2,091,521	2,364,386	2,620,184
	88,603	14,081,762	16,261,183	18,534,332
IRELAND	32,583	6,801,827	7,767,401	8,175,124
ISLANDS—				
Guernsey, etc..	50	20,827	6,128	28,521
Jersey	62	28,600	36,582	47,544
Man	220	40,081	41,000	216,079
Army, Navy, etc.	....	307,790	277,017	47,975
Total	121,518	21,280,887	21,409,311	27,049,575

	Population according to Census of			
	1861.	1871.	1881.	1901.
GREAT BRITAIN—				
England	18,949,930	21,495,131	25,968,286	32,526,075
Wales	1,111,795	1,217,135		
Scotland	3,061,251	3,360,018	3,735,573	4,472,103
	23,122,976	26,072,284	29,703,859	36,998,178
IRELAND	5,792,055	5,411,416	5,174,836	4,458,775
ISLANDS				
Guernsey, etc..	35,362	33,969		
Jersey	56,078	56,627	147,223	148,331
Man	52,339	54,042		(1905)
Army, Navy, etc.	275,900	229,000	242,844	254,748
Total	23,334,710	31,857,338	35,262,762	41,607,552

The total area of Great Britain and Ireland is 77,109,000 acres, of which 13,504,000 acres are uncultivatable or uncultivated; 3,038,000 acres are under woods and plantations; 23,412,000 acres consist of grazing lands on hills and heaths; and 37,156,000 acres are under crops and grass. In 1905, 7,054,232 acres were under corn crops in Great Britain, 3,077,042 acres under green crops, 4,477,518 acres in clover and mature grasses, 17,200,494 acres in permanent

pasture. The live stock in that year totalled 1,572,433 horses, 6,097,020 cattle, 25,257,193 sheep and 2,424,919 pigs. Of the land holdings in Great Britain, 27,937,470 acres were rented by the occupiers and 4,640,043 owned by occupiers. In Ireland there were 1,271,150 acres under corn crops, 1,044,393 acres under green crops, 1,255,092 acres under clover, etc., 11,637,330 acres under permanent pasture. Its live stock included 541,868 horses, 4,645,222 cattle, 3,749,313 sheep and 1,164,322 pigs. In Great Britain and Ireland (1905) there were 1,834,849 acres in wheat; 1,868,107 acres in barley; 4,117,968 acres in oats; 255,567 acres in beans; 172,931 acres in peas; 1,225,096 acres in potatoes (of which half was in Ireland); and 1,871,497 acres in turnips. The farming interests of the United Kingdom have suffered greatly in recent years from a succession of bad seasons, and the great advance in American and other competition. Some farmers were ruined, and many farms remained unlet. This naturally led to an enormous falling off in rents, to the extent 1880–81 of 20 to 50 per cent. By the Irish Land Purchase Act of 1903 $12,000,000 was set aside by Parliament for the aid of tenants who wished to own their land.

Fisheries.—The principal fisheries of the United Kingdom are those of salmon, herring, cod, haddock, turbot, soles, and other flat fish. The first is principally carried on in the estuaries and rivers of Scotland and Ireland; the second, principally on the coasts of the Scottish mainland and on adjacent islands. In these localities large quantities of herring are cured and exported. Cod and haddock are caught in great numbers in the North Sea, especially on the Dogger Bank. Among other fish procured in less quantity are pilchards, mackerel, oysters, and lobsters. In 1906 the fish production amounted to 1,026,280 tons, valued at £10,915,970. The number of men employed in this industry (1905) was about 106,793, and there were 26,501 registered boats.

Commerce.—The imports, 1905, included grain and flour, £70,056,794; meat and animals for food, £40,411,842; other food and drink (non-dutiable), £63,072,019 and (dutiable) £46,101,099; tobacco, £3,731,969. The raw materials for manufacture totalled £188,071,567, of which iron ore and steel amounted to £5,530,784 and other metallic ores to £7,611,185; wood and timber, £23,276,358; cotton, £52,370,878; wool, £26,648,261; and other textile materials, £14,517,288; oil seeds, nuts, oils, etc., £23,594,010; hides and undressed skins, £8,084,824; paper-making materials, £3,804,692; and miscellaneous products, £22,600,000. Of manufactures there were imports totalling £142,577,665, with iron, steel and other metals amounting to £30,000,000; cottons, £7,920,389; woolens, £12,523,997; and other textiles, £19,244,329; chemicals, drugs, etc., £9,624,607;

leather, and manufactures of, £11,037,702; paper, £5,256,145. There was an export of food products (not including grain or meat) totalling £19,472,952; of coal, coke, etc., £26,061,117; of manufactured articles totalling £269,959,757, and including machinery, £23,257,621; cottons, £91,987,493; woolens, £29,938,260; other textiles, £31,204,031; apparel, £14,535,195; iron and steel, £31,827,142.

Gold and Silver Bullion and Specie.—The computed real value of the gold and silver bullion and specie brought into the United Kingdom (1858) was £29,493,190; (1859) £37,070,156; (1860) £22,978,196; (1861) £18,747,045. Of this quantity, Australia sent by far the most—viz., (1858) £9,066,289; (1859) £8,627,854; (1860) £6,719,857; (1861) £6,331,828. Mexico, S. America, and the W. Indies were the next largest exporters: then the United States and France. The exports from the United Kingdom during the same period were (1858) £19,628,876; (1859) £35,688,803; (1860) £25,634,768; (1861) £20,811,648. The declared real value of gold and silver bullion and specie imported into the United Kingdom during 1871 was—gold, £21,613,005; silver, £16,527,322; total, £38,140,327; exported—gold, £20,698,275; silver, £12,062,396; total, £33,760,671. The declared real value of such bullion and specie imported during 1905 was as follows—gold, £38,567,895; silver, £12,992,014; total, £51,559,909; exported—gold, £30,829,842; silver, £14,561,677; total, £45,391,519.

Shipping.—Great Britain had, in 1861 (exclusive of river-steamers), 19,288 registered sailing-vessels, with an aggregate burden of 3,918,511 tons, and 997 steamers, carrying 441,184 tons; making together 20,285 vessels, of 4,359,695 tons burden, and employing, exclusive of masters, 171,957 seamen. The United Kingdom had in 1901 (exclusive of river steamers) 10,572 registered sailing vessels, with an aggregate burden of 1,990,627 tons, and 9,484 steamers, 7,617,793 tons, making 20,056 vessels of 9,608,420 tons burden and employing, exclusive of masters, 247,973 seamen. During the same year there were built and registered for other countries 265 vessels, 194 of them steam, aggregating 207,452 tons. Total tonnage of vessels entering British ports in 1891 was 40,001,000 tons, and clearing 40,537,000 tons. Of this 73 per cent. was British. In 1904 the total number of sailing and steam vessels registered in the United Kingdom was 20,580 with a tonnage of 10,554,520; the number built was 1,043 for home use and 207 for foreign customers, with a respective tonnage of 735,384 and 148,875; the number of men employed on British vessels was 259,489 of whom 39,832 were foreigners and 42,682 coasters; the total tonnage of British vessels entering and clearing at the ports of the United Kingdom was 69,654,000 and foreign vessels 38,736,000;

the coastwise tonnage entering was 60,807,370 tons and clearing 59,096,433 tons. The total vessels entering the ports of the United Kingdom in 1904 numbered 370,694 of 114,626,044 tons.

Railways.—The lines open in 1904 totalled 22,634 miles in length with a paid-up capital of £1,268,494,681; passengers carried numbering 1,198,773,720 and total receipts from traffic of, £111,833,272. On Mch. 31, 1905, there were 2,177 miles of tramway lines open with receipts totalling £9,917,026, working expenses £6,565,049. The passengers carried in the year were 2,068,913,226. British canals had in 1898 a total of 3,907 miles in length with a traffic of 39,358,394 tons and a revenue of £2,408,534. The expenditures were £1,764,037.

Post and Telegraphs.—The number of post offices, 1905, March 31, were 23,068 with 2,624,000,000 letters delivered in the fiscal year or 61 per head of the population. The money orders issued £35,644,916 (Ireland) and over £7,000,000 foreign and Colonial. Of telegraph messages the United Kingdom had 88,969,000 despatched in the year. Its mileage of telegraph line was 52,518, and of wire 589,839.

Revenue and Expenditure.—The income of the United Kingdom is derived from customs and excise duties, probate and legacy duties, stamps, land-tax, house duty, property and income tax, the post-office, the telegraph service, the hereditary revenues of the crown from woods, forests, and lands, and from a number of minor sources. The expenditure is classed under two heads: (1) the consolidated-fund services, or sums authorized by acts of parliament to be paid from the consolidated fund; (2) the supply services, which include payments for interest and management of the national debt, civil list and annuities to the royal family, and salaries and pensions. The financial year ends Mar. 1, and the chancellor of the exchequer soon afterward presents the 'budget,' which is the official statement of income, expenditure, and national indebtedness. Of the 1905 revenue totalling £143,958,819, customs was responsible for £35,620,000; excise for £30,698,000; estate duties, etc., £13,010,000; stamps, etc., £7,803,000; property and income tax, £31,263,000; post-office, £16,031,000. Of the expenditure (£141,956,497), national debt charges totalled £27,000,000, the army cost £29,224,000, the navy cost £36,830,000, the civil service charges were £27,450,000 and the post-office cost £10,198,000. The gross national debt of Great Britain (1905, Mch. 31) was £796,736,491, with assets of £40,000,000, being less than the gross annual value of property and profits assessed to income tax, and £125,000,000 less than the British trade of 1904. The national wealth of the United Kingdom was estimated in 1885 at £10,000,000,000 and more recently (1903) at £15,000,000,000. In

1902–3 the local taxation of England and Wales was £129,206,784, of Scotland £16,647,000, and of Ireland £6,437,530. Since 1842 revenue and expenditure have been, in million pounds sterling:

Period.	Revenue.	Expenditure.
1842–51	567	549
1852–61	678	709
1862–71	711	692
1872–81	799	794
1882–88	616	619
47 years	3,371	3,363

In 1890 the revenue was £89,304,316, and the expenditures £86,083,314; in 1900 they were respectively £119,839,905 and £133,722,407; in 1906 they were £143,977,575 and £140,511,955.

The increase in imports and exports has been as follows:

Year.	Imports.	Exports.
1880	£411,200,000	£286,400,00
1887	362,200,000	280,800,000
1888	387,635,743	297,885,236
1890	420,692,000	338,253,000
1891	435,441,000	309,114,000
1892	423,794,000	291,640,000
1893	404,688,000	277,138,000
1894	408,345,000	273,786,000
1895	416,690,000	285,832,000
1896	441,807,000	296,389,000
1902	528,800,284	349,350,664
1903	542,600,289	360,373,672
1904	551,038,628	371,015,321
1905	565,279,402	407,821,988

Form of Government.—The government of Great Britain is of the kind known as a 'Constitutional Monarchy,' in which the sovereign accepts of his dignity under an express agreement to abide by certain prescribed conditions (see CORONATION OATH). The sovereignty is hereditary in the family of Brunswick, now on the throne, and in the person of either a male or a female. The sovereign (king or queen) is the directing power in the executive of government; while the legislative function is exercised by parliament. For further information regarding the British constitution and laws, see PARLIAMENT; MINISTRY; COMMON LAW, COURTS OF; JUDGES; etc.

Army and Navy.—The estimates for 1905–6 fixed the number of regular troops, exclusive of those serving in India, at 221,300. The total strength of the regular army, 1904, Oct. 1, was 21,690 cavalry, 55,689 artillery, 11,457 engineers, 183,034 infantry, and 15,370 special corps, or a total of 11,156 officers, and 287,240 uncommissioned officers and men. Of these 102,099 were serving in England, 28,287 in Ireland, 72,806 in the Colonies, Egypt, etc., and 76,938 in India. Beside this there was an army reserve of 80,000, a militia force of 148,000, yeomanry of 28,114, and volunteers 346,136 —a total establishment of 884,000 officers and men.

In the navy the estimates of 1905–6 provided for 129,000 officers and men on sea service, in marines, coast guard and special services. There were in March, 1906, 42 modern battleships and 8 older ones, 32 armored cruisers, 64 protected cruisers, 24 gunboats, scouts, etc., 147 destroyers, 40 effective torpedo boats, and 35 submarines.

Religion.—The United Kingdom is a Protestant state, but all religions—not offensive to public or private morals—may be professed, and their different forms of worship practiced, without interference from any quarter whatever. There are two churches 'established' by special acts of the legislature. In England, the established church is Episcopal in its government (see ENGLAND, CHURCH OF). In Scotland, the established church is Presbyterian (see SCOTLAND, CHURCH OF). In England and Wales there were in 1901, 14,900 parishes of the Church of England. In 1904 there were 15,538 registered churches and chapels in which marriages could be solemnized. In about one-half the parishes the income is less than £130 a year. The gross income from ancient endowments (1896) was £5,469,171, of which £1,247,827 was from property vested in the ecclesiastical commissioners. The total annual income is now estimated at £7,250,000. Large voluntary gifts are received for church work.

In 1905 the number of communicants was over 2,200,000; the Sunday School teachers numbered 209,338 and the scholars 2,467,902; the gross annual income of the clergy was $4,539,350; the sitting accommodation in parish churches and chapels 6,448,646.

Among the Prot. dissenting bodies the most numerous membership is in the various sects of Methodists, including Old and New Connection, Primitive and Free Church, Bible Christians, Wesleyans, and others. These denominations possessed (1891) more than 15,200 chapels and number 801,000 members. The Independents or Congregationalists 1896 had 4,592 churches and preaching stations, containing 1,613,722 sittings; 2,804 ministers, of whom 633 were without charge; and 360,000 members. The Roman Catholics in England and Wales were estimated at 1,500,000 in 1906, with 15 dioceses, 1,703 chapels and stations, and 3,848 officiating clergy. In 1905 the Baptists of England had 424,741 communicants with 2,134 pastors, and 5,748 local preachers; the Congregationalists or Independents, 459,614 communicants with 2,950 pastors and 5,012 local preachers; the various divisions or denominations, Methodist, 1,183,496 communicants, with 5,511 pastors and 42,962 local preachers. According to the 1901 census there were altogether 11,572 dissenting ministers in England and Wales.

In Scotland under the established church (Presb.) the country is divided into 16 synods, 84 presbyteries,

and (1906) 1,405 parishes with 1,659 churches, chapels, and stations. The number of communicants (1894) was 620,376, and these raised £429,851 for home and missionary purposes. In 1905 the number was 692,914. The entire endowments from all sources amount to probably not more than £350,000 a year. The church (1845–1905) has erected and endowed churches for 399 new parishes at a cost of over £3,000,000.

The Free Church of Scotland had (1895) a total of 1,267 ministers and missionaries, 1,049 churches, 283,659 members, and 109,454 adherents. The population connected with the church was claimed to be 1,400,000. The income from all sources was £650,323. The aggregate funds raised from 1843–96 amount to £23,984,810. The United Presb. Church (1895) had 613 ministers, 578 churches, 41 home stations, 191,881 members, besides adherents, and an income of £410,853. These two churches were united in 1900 as The United Free Church of Scotland with (1905, Dec. 31) 1,688 congregations, 1,800 ordained ministers, 504,853 members, 2,422 Sunday Schools, and 340,539 children in attendance. The Episcopal Church in Scotland had (1906) seven bishops, 383 churches and missions, 324 clergy, and claimed the adherence of 133,000 people. The Rom. Cath. Church in Scotland had (1906) two archbishops, four bishops, a bishop-auxiliary, 540 priests, 373 churches, chapels, and stations. The number of adherents was estimated at 400,000.

In Ireland the Rom. Cath. Church is under four archbishops and 23 bishops. The Rom. Cath. population was returned (1901) at 3,308,661, or 74.2 per cent. of a declining population. The (Prot. Episc.) Church of Ireland had (1906) two archbishops, 11 bishops, and 1,700 clergy. It had 1,400 churches with a membership representing 580,000 pop. Voluntary contributions were received (1905) to the value of £209,000. The census (1901) showed in Ireland 453,173 Presbyterians, 62,006 Methodists, 10,142 Independents, 7,062 Baptists, 8,094 Unitarians, and 3,898 Jews.

Education.—In England, the chief institutions for education are the ancient national universities of Oxford and Cambridge; the more recent institutions of London, Durham, and Lampeter in Wales; the classical schools of Eton, Westminster, Winchester, Harrow, Charter-house, and Rugby; Owens College, Manchester, and other colleges and schools chiefly for physical science; the various military schools; the colleges of the dissenting denominations; the middle-class schools, started either by individual teachers, and hence called 'adventure' schools, or by associated bodies acting as directors, to whom the teachers are responsible; and the schools of design.

For primary education, a national system has now been established. Under the Elementary Education Act

for England, 1870, a popularly elected school-board is established in any district where the existing schools are deficient. Schools under the act are supported by school rates and fees, and by parliamentary grants, varying according to the number of pupils and their proficiency as tested by different standards of examination. They are to be open at all times to government inspection. It is left to the discretion of school-boards to make education compulsory.

Scotland has four universities for the higher branches of education—Edinburgh, Glasgow, St. Andrews, and Aberdeen—beside a variety of minor colleges connected with the Episcopal, Free Church, and other non-established churches. The Scotch Education Act, 1872, is modelled after the English Act, but differs from it by enacting that a school-board is to be elected in *every* parish and burgh; by making it illegal for parents to omit educating their children, between 5 and 13, in reading, writing, and arithmetic: and by comprehending higher class schools. In 1901 there were in England and Wales 5,857 Board schools with an average attendance of 2,259,259 pupils, 11,731 nat. society schools with 1,882,184 pupils, 458 Wesleyan with 126,879 pupils, 1,053 Rom. Cath. with 257,383 pupils, 1,052 undenominational and other schools with 215,926 pupils; total 20,151 schools and 4,741,431 pupils. In same year there were 66,149 certificated teachers, 34,716 asst. teachers, 28,002 pupil teachers. In 1905 following the changes brought about by the Education Act of 1902 there were 20,513 schools (of which 11,418 were voluntary or Church of England schools), with average attendance of 5,249,485 and registered total of 6,045,380. The certified teachers (1905) were 78,343, the uncertificated 42,346, the supplementary 19,136, the pupil-teachers 23,465. There were also 30 higher elementary with various special schools and training colleges with 7,522 students. In Scotland (1905) there were 3,244 schools, with average attendance 696,381 pupils. In Ireland there were (1905) 8,659 schools in operation, with an average attendance 500,489. The Parliamentary grants for primary schools in the United Kingdom (1906) were £14,982,922.

History.—1707, May 1, during the reign of Queen Anne, the union of England and Scotland was formally accomplished. (For the previous history, see ENGLAND; SCOTLAND.) In Scotland, the terms at first excited the utmost dissatisfaction, and even indignation; but the progress of time has shown it to be one of the greatest blessings that either nation could have experienced. The last years of Queen Anne's reign were marked by the triumph of the Tory party, headed by Harley and St. John (Lords Oxford and Bolingbroke), who kept up a constant intrigue with the Pretender, for the purpose of procuring his restoration. This intention was de-

feated by the sudden death of her majesty in 1713. According to the Act of Settlement, she was succeeded by the Elector of Hanover, who took the title George I. The whigs then regained their ascendency, and, under the guidance of Walpole (q.v.), now rising to eminence, at once proceeded to impeach the more important of the tory leaders. Other severities drove the more impatient of that party to attempt bringing in the Pretender by force of arms. In 1715, the Earl of Mar in Scotland, and the Earl of Derwentwater in England, raised the standard of rebellion; both efforts, however, proved abortive, and were speedily crushed. Five years later occurred the frightful financial catastrophe known as the South Sea Bubble, when the nation was saved from anarchy mainly by the exertions of Walpole. The latter then became premier and chancellor of the exchequer; and under him the commerce and manufactures of England continued steadily to advance, though little improvement was as yet perceptible either in Scotland or Ireland. George I. died 1727, and was succeeded by his son, George II. An attempt was again made by the tories to oust the whigs from power, but was frustrated by Walpole, who still continued the prime mover of public affairs. In 1739, after a peace of extraordinary duration, he was forced by popular clamor into a war with Spain, on account of some efforts made by that country to check an illicit trade carried on by British merchants in its American colonies. This war was feebly carried on, and ingloriously terminated; but the attention of England was speedily drawn toward the Austrian war of succession, in which it was involved through the anxiety of the king for his Hanoverian possessions, and the strong antipathy of the people to the French. Walpole, disapproving of the war, was driven from office 1743. George II. appeared on the field of battle himself, and at Dettingen proved himself a man of courage and spirit. But the success of the French at Fontenoy, 1745, paralyzed the efforts of England during the rest of the campaign; and 1748, after nine years' fighting, a peace was concluded at Aix-la-Chapelle, by which it was agreed that both nations should mutually restore their conquests, and go back to exactly the same condition as they were in before the war. Meanwhile, a second attempt had been made (1745–6), by Prince Charles Edward Stuart, to win back the throne of his ancestors. This attempt, known as the second rebellion, after the acquisition of Edinburgh by Prince Charles, and victories at Prestonpans and Falkirk, was crushed at Culloden (1746, Apr. 16), and shortly afterward a variety of important measures were passed by the imperial parliament relating to Scotland generally, and to the Highlands in particular, which had the effect, on the whole, both of conciliating the inhabitants, and of advancing their

civilization. Then, after a long period of indolence and poverty, Scotland began to make progress toward that equality with England, in comfort and prosperity, which it has since attained.

In 1756 broke out the 'seven years' war,' in which Britain took the side of Frederick the Great against France, Austria, Russia, and Poland. It achieved no triumphs in Europe; on the contrary, it suffered a signal disgrace in the surrender of the Duke of Cumberland, with 40,000 men, in Hanover; but in India, Clive deprived the French of most of their possessions, while Wolfe, in the new world, conquered their colony of Canada. In the midst of this war, George II. died (1760), and was succeeded by his grandson, George III., whose reign proved almost the longest and one of the most eventful in British annals. At this time, the principal sec. of state was William Pitt, afterward the great Earl of Chatham; but the favor which George III. showed to the Earl of Bute, a feeble and narrow-minded tory nobleman, rendered it necessary for the former to retire from office. Spain now joined France against Britain, as Pitt had foreseen and foretold; but success was given to the arms of the latter, and at the peace of Paris, 1763, Britain was allowed to retain many of the most valuable colonial possessions of both her antagonists. These wars, however, largely increased the national debt.

George III. now showed himself anxious to destroy the influence of the great whig families who had brought in the dynasty to which he belonged. The nation took the alarm, and for some time was strongly disaffected toward its sovereign, who was believed to be wholly under the influence of his Scotch premier, the Earl of Bute. Popular indignation at last forced the latter to resign, 1763. His successor, Grenville, inaugurated his advancement to office by the prosecution for libel of Wilkes, the member for Aylesbury, who had made himself conspicuous by his attacks both on Bute and his royal master. The proceedings in this case lasted some years, and were attended with serious tumults, and a vehemence, if not rancor, of public feeling that indicated the magnitude of the prevailing discontent. During the administration of Grenville, too, the first attempt was made to tax the American colonies by the passing of the succeeding Stamp Act, 1765. Against this the colonies protested, and the whig ministry of Rockingham repealed it. This ministry, however, was of short duration, and was replaced by one formed by Pitt, now created Earl of Chatham. The necessity for an increase of the finances led to another attempt at American taxation; and an act for imposing duties on the imports of tea, glass, and colors was passed. This measure, and other incidents of error of maladministration, excited the most determined oppo-

sition among the colonists; and finally, 1775, war broke out between them and the mother-country, which lasted eight years, and in which the colonies were supported by France, Spain and Holland. It resulted in the acknowledgment of their independence, and in the recognition of the republic of the United States (1782). During almost the whole of this unhappy contest, the ministry of Lord North directed the policy of the country; and it was only the success of a vote for the conclusion of the war that forced them to resign, early in 1782. It was followed by the second Rockingham ministry, and that soon afterward by the Shelburne ministry, remarkable only for the appearance in it of the younger Pitt. The lukewarm whiggism of Lord Shelburne gave offense to Fox and other more advanced political thinkers; the result was a coalition of the Foxites with the followers of Lord North. This coalition, factious and unprincipled in the last degree, triumphed, and under the name of the coalition ministry, held the seals of office during 1783. Fox's *India Bill*, the purpose of which was virtually to transfer the government and patronage of India from the E. India Company to the house of commons, was the cause of its ruin. This bill was considered by the king to aim at fixing the ministry in power beyond the control of both himself and the people, and having induced the house of lords to reject it, he compelled the ministry to resign. Pitt was then appointed prime minister and chancellor of the exchequer (see PITT). In 1786 commenced the trial of Warren Hastings, who was impeached by the whig leaders, Fox, Burke, and Sheridan, but was ultimately acquitted. Meanwhile, the progress both of England and Scotland was unquestionable; manufactures increased, agriculture improved, and—especially in Scotland—an interest in the discussion of political and other questions of importance spread through the community, as is seen clearly in the poetry of Robert Burns. The French Revolution (1789) at first strengthened this interest, but the excesses of the reign of terror produced a decided reaction; and for many years all classes, at least all the so-called 'respectable classes,' were fanatically averse to the slightest innovation. In 1793, the ministry of Pitt declared war against the French republic, in spite of the opposition of Fox and Sheridan. This contest lasted till the peace of Amiens 1801, and was, on the whole, very disastrous to Great Britain, except at sea, where the victories of Howe off Brest, Jervis off Cape St. Vincent, Duncan off Camperdown, and Nelson at the Nile, at Copenhagen and in Aboukir Bay, served to sustain the spirit of the nation. Other features of the time were the *threatened* invasion of Britain by the French, which called forth volunteer corps in every part of the island; the Irish rebellion of 1798, which, though assisted by

a French force, proved a failure; and the trial and condemnation at Edinburgh of the popular performers, Mure, Palmer, and others. Pitt, who had left office just before the peace of Amiens, was succeeded by Addington, who was compelled to renew the war with Bonaparte 1803, because of Bonaparte's evading the fulfilment of the conditions of that peace. Again, Bonaparte threatened to invade the country, and collected an immense flotilla at Boulogne, professedly for that purpose, 1803, but was completely kept in check by Nelson. The battle of Trafalgar 1805 nearly annihilated the navy of France and Spain. But on land, the arms of France were victorious; and the battle of Austerlitz (1805) broke up most effectually that coalition of continental powers against France which Great Britain had fostered and formed. The shock of this disaster gave a death-blow to Pitt, who died in the beginning of 1806, and was followed to the grave in the autumn of the same year by his rival, Fox. The overthrow of Prussia at Jena and Auerstadt, and of Russia at Friedland, placed Great Britain in a most perilous predicament. All the nations of Europe were compelled by Bonaparte to exclude British merchandise from their ports, and the island of Great Britain itself was declared in a state of blockade.—*Berlin Decrees*, 1807. Secure, however, in the protection of her invincible navy, she bore up bravely against her terrible isolation, increased her intercourse with her own vast colonies, ruined the commerce of her enemies, and never ceased her efforts to undermine the influence of her great enemy on the continent. The first people that showed a tendency to revolt against the arrogant tyranny of Bonaparte were the Spaniards. Great Britain at once offered to assist them with arms and money; and 1808 a force was landed in Portugal, under the command of Sir Arthur Wellesley, afterward Duke of Wellington. The war which ensued (the 'Peninsular war') lasted till 1814, and ended in the French being driven back in disorder into their own country at Toulouse—after losing the memorable battles of Vimiera, Talavera, Busaco, Cindad, Rodrigo, Salamanca, and Badajoz. Meanwhile, ruin had overtaken the French army in Russia; Austria, Prussia, and Russia had combined with Great Britain against Bonaparte; and 1814 the allies entered Paris, and the French emperor was forced to abdicate, and retire to Elba. His return 1815 once more threw Europe into agitation; but his power was finally shattered at Waterloo by Wellington and Blücher, and peace restored to Europe. The contest had cost Britain (which had to subsidize most of her allies) an enormous expense.

Now that the long conflict between France and Europe was over, the thoughts of the people were turned again to the question of political reform. Four years

of extraordinary mercantile depression, which followed the victory at Waterloo, partly resulting from bad harvests, and partly from Great Britain's having ceased to enjoy that monopoly of commerce which she had held during the war, had made the people discontented, and the shameful massacre of the Manchester operatives in St. Peter's Fields by the yeomanry 1819—commonly known as the Peterloo massacre—excited strong indignation; but a horror of anything revolutionary still possessed the upper and a large section of the middle classes, and severe measures were passed with a view to the suppression of discontent among the working-classes. In 1820 George III. died, and was succeeded by his eldest son, George IV. The trial of the latter's consort, Queen Caroline, which occurred in the same year, shattered his popularity, never very great. The commercial reforms of Huskisson, supported by Canning, which marked the next two years, added immensely to the prosperity of Great Britain, and capital grew so abundant that a vast number of joint-stock companies were formed, as a means of giving it a wider range. Many of their projects for traffic in remote countries were visionary and ended disastrously, involving in ruin (between 1825, Oct., and 1826, Feb.) 59 English provincial banks, and inflicting great misery on the working-classes. About the same time, the Irish Rom. Catholics began to clamor for emancipation from their civil disabilities. The older and more inflexible tories, still dominant in parliament, opposed it; but the intense determination of the Irish people, and the powerful eloquence of their champion, Daniel O'Connell, at last prevailed, and 1829 the ministry of Wellington, yielding to the storm, itself proposed and carried the measure. In 1830, George IV. died, and was succeeded by his brother, William IV. The outburst of the July revolution in France quickened the pace of British reformers; the demand of the nation for an improvement in the parliamentary representation became very strong; and 1830, Nov., after an exclusion from office of nearly half a century, the whigs once more ascended into power 'on the breath of popular applause,' and the ministry of Earl Grey immortalized itself by passing the 'Reform Bill.' Another of its claims to the respect and gratitude of posterity was the abolition of slavery in the British colonies (1834). The reform of the English poor-law, and in the mode of electing municipal authorities in Scotland, also deserves mention; but in 1834 the whig ministry was dismissed by the sovereign. Sir Robert Peel now became premier, but the whigs were still a majority in the house, and Peel was compelled to resign. The Melbourne administration which followed carried several small though beneficial measures of reform, but failed to secure the attachment of the people.

The lower classes were becoming radical and chartist, while the middle classes, contented with the political power which the Reform Bill had secured to them, were growing apathetic, and in many cases, from dread of the masses, were leaning toward toryism. In the midst of these perplexities, William IV. died, 1837, and was succeeded by his niece, Princess Victoria, the ruler of the empire up to 1901. In 1841, the whig ministry succumbed to a vote of 'no confidence,' and Sir Robert Peel once more assumed the helm of state. The principles of free trade now began to be actively advocated; public opinion was leavened by the platform addresses of Richard Cobden and John Bright, until the prime minister himself was finally converted, and in 1846 carried, what he had long opposed, a measure for the abolition of the *Corn-laws* (q.v.). Three years before the abolition of the corn laws, a great schism took place in the Established Church of Scotland, and led to the formation of a body calling itself the 'Free Church of Scotland' (q.v.). Other important incidents of this period were the Chinese and Afghan wars; the Chartist agitation, which reached its climax in the monster petition of 1848, got up by Feargus O'Connor and his friends; the series of failures in the potato-crop of Ireland, involving that country in terrible misery, and inundating Great Britain with paupers. Sir Robert Peel was succeeded in the government of the country by Lord John Russell, who did not prove as popular a minister as was anticipated, and in 1855 the old tory party returned to power, headed by the Earl of Derby and Mr. Disraeli. It was, however, beaten on its budget, and forced to resign in less than a year, when its place was taken by the coalition cabinet of Lord Aberdeen. During the ministry of this nobleman the *Crimean war* began (1854); but the administration soon became unpopular in its conduct of the war and Lord Aberdeen was obliged to make way for Lord Palmerston (1855). France and Sardinia fought with Great Britain this war and the chief victories of the Allies were those of Alma, Inkerman, Balaclava and the capture of Sebastopol. It ended with the Treaty of Paris (1856), and somewhat drastic terms for Russia, which were, however, modified by the Gladstone Government (1871).

In 1857, March, the Indian Mutiny broke out, and the energies of the government were taxed to the utmost to suppress it, but were eventually completely successful, through the heroism of the British soldiery. From 1855–65 (except for a brief interval, when Lord Derby returned to office), the government was in the hands of Lord Palmerston. During this period England carried on a successful war against China, and the volunteer movement was begun. The American War of secession caused great distress among British cotton operatives. Through the escape of the *Alabama* from a British port

Great Britain, under the Geneva arbitration (1871) had to pay the United States heavy damages, while by the seizure of the Confederates, Mason and Sliddel, from a British vessel in 1861, the two countries were brought into relations of temporary hostility. In 1861 Prince Albert died. In 1866 Earl Derby was at the head of affairs: Britain was connected with America in that year by the submarine telegraph, and the Fenian insurrection occurred. The year 1867 was marked by the passing of a conservative Reform Bill, which added more than half-a-million electors to the constituency of Great Britain; and by the expedition against Abyssinia, under Sir Robert Napier, which, in 1868, resulted in the destruction of Magdala, and death of King Theodore. During the government of Mr. Disraeli, who succeeded Lord Derby, Scotch and Irish Reform Bills were passed, and an act discontinuing public executions. In 1869, Mr. Disraeli having resigned, an act was passed by the liberal government under William E. Gladstone, for disestablishing the Irish Church. The years 1870 and 72 produced the Education Acts for England and Scotland. In 1873-4, the Ashanti (q.v.) war was carried on to a successful termination; and the latter year witnessed the establishment of a conservative government under Mr. Disraeli (who became Earl of Beaconsfield 1876). This administration was characterized by its tendencies toward 'imperialism,' and by what was spoken of as a spirited foreign policy during the unusually critical phase of the Eastern question, which was temporarily settled at the Berlin Congress (1878). The English premier and his foreign secretary were declared to have brought home 'peace with honor' from that meeting. Among other events of this period were the annexation of Fiji (1874), and of the Transvaal (1877); the proclamation of the queen as empress of India (1877); the bringing of Indian troops to Malta (1878); and the conditional convention with Turkey, which secured the right of administering government in Cyprus (1878). The tedious Afghan war was begun in the end of 1878; and the war with the Zulus, in which occurred the disaster at Islandhlwana, began and ended 1879. In home politics, the obstructions of Irish home rulers caused serious inconvenience. The latter years of this administration were a time of severe commercial depression. Parliament was dissolved early in 1880, when a general election returned a large liberal majority; the government resigned, and a new administration was formed by Gladstone. The extravagant proceedings of some of the Land League agitators in Ireland, accompanied by numerous cases of bloodshed and outrage, compelled parliament 1881 reluctantly to pass a Peace Preservation or Coercion Bill for Ireland. The measure conferred on the administration the power of imprisoning without trial

persons reasonably suspected of crime; and under its authority the leaders of the Land League, including several Irish members of parliament, were ultimately put in jail. Meanwhile, an Irish Land Act conferring unparalleled privileges on the Irish tenantry had been passed, in spite of much opposition, especially in the house of lords. This act enabled tenants to have judicial rents fixed by courts created for the purpose, recognized the tenant's right to sell his tenancy, and made provision for advancing money to tenants willing to purchase their holdings. In the same year English troops were finally withdrawn from Afghanistan. With the Boers of the Transvaal, who had risen in arms, it was agreed that their territory should possess autonomy, but remain under British suzerainty. In 1882 the affairs of Ireland still mainly occupied parliament. A modification of parliamentary procedure was necessituated by the repeated and persistent obstruction of the Irish members; and government introduced a bill securing to a majority of the house of commons the right of closing a debate. The government released the chief political suspects imprisoned in 1881 (see FORSTER, WILLIAM EDWARD). The new Irish sec., Lord Frederick Cavendish, was assassinated on his first visit to Dublin. A new Prevention of Crime Bill seemed called for, as outrages still occurred; but a conciliatory measure was prepared dealing with arrears of rent, and designed to rescue poverty-stricken tenants from hardship. The short and brilliant military expedition to Egypt (q.v.) in 1882 involved the government in the task of reorganizing Egyptian political institutions. The chief succeeding events were the unfortunate Soudan campaigns—including the expedition of Gordon (1884, Jan.); British victory at El Teb and at Tamaniets; the withdrawal of British forces and Gordon's long seige in Khartoum; the Wolseley expedition; the death of Gordon, and final British victories—the dynamite outrages of Irish-Americans, complications with Russia in relation to Afghanistan, the passing of the Franchise and Redistribution Acts, the unsuccessful revolts of the 'half-breeds' in Canada, the resignation of Mr. Gladstone and Lord Salisbury's accession to office, the general election (1885, Dec.), with Mr. Gladstone's subsequent return to power, his retirement and Lord Salisbury's return 1886, the defeat of Mr. Gladstone's home-rule for Ireland bill, 1886, the cession of Cyprus to Great Britain by Turkey, the celebration of the 50th anniversary of Queen Victoria's accession to the throne, and the annexation of Zululand 1887, and the 'Parnellism and Crime' investigation 1888–9.

In 1890 Irish and domestic affairs chiefly marked the opening of parliament; during the year the island of Heligoland was ceded to Germany in return for African concessions, and the end of the year witnessed the fall

of Parnell from his position of influence, owing to disreputable disclosures concerning his private character. The Bering Sea controversy and Australian federation were subjects uppermost in discussion 1891. The most important event of 1892 was the change in the govt. The queen's speech at the opening of parliament was formally approved in the house of lords; in the commons it was the means of testing the strength of the two main parties. The usual address of acceptance having been moved by the conservatives, Mr. Asquith, on behalf of the liberal opposition, moved an amendment declaring no confidence in the government. The amendment was adopted by a majority of 40, and on the following day Lord Salisbury tendered the resignation of the conservative ministry. In response to the royal summons, Mr. Gladstone submitted to the queen a list of cabinet officers for approval, and the new govt. was at once officially announced, Mr. Gladstone being Lord privy seal. Early in 1893 Mr. Gladstone introduced a new home-rule bill, which evoked a debate remarkable for the absence of acrimony. The first practical step toward disendowment and disestablishment of the church in Wales was taken in Feb. by introduction of a bill suspending all appointments to bishoprics, dignities, and benefices in Wales, as well as the creation of new vested interests in churches. In Aug. the Bering Sea award was made public. In this month debate on the home-rule bill in the commons occupied more than 80 days, the measure passing its second reading by a majority of 34. It was rejected by the house of lords by a vote of 419 to 41. A great strike of 500,000 colliers was finally settled by judicious arbitration. One of the most memorable events of 1894 was the retirement of Mr. Gladstone, owing to failing eyesight and other infirmities. He was succeeded in the liberal leadership by Lord Rosebery, who duly announced that his policy would not be to give home rule precedence over other reforms. The anti-Parnellites, under the leadership of Justin McCarthy, acquiesced in the inevitable. Disestablishment of the church in Wales was again attempted. In July, after a vote in the commons of censure on the govt., Lord Rosebery's ministry resigned, and Lord Salisbury was requested by the queen to form a cabinet. He accepted the premiership. Writs were issued for the election of a new parliament, and the returns showed: conservatives and liberal unionists in alliance, 411; all others, 259; joint majority of conservatives and liberal-unionists; 152; the conservative majority over all others combined being 6. In accordance with a royal proclamation, 1897, June 20, was observed throughout the British Empire as a day of thanksgiving for the completion of sixty years of the queen's reign, and following this several days were given to splendid pageantry in which the participation of

Colonial Prime Ministers, Indian princes, and troops from all parts of the British empire were prominent features.

The principal incidents since then have been as follows:

1898.

May 19.—Death of Rt. Hon. W. E. Gladstone at the age of 88.

July 13.—Penny Postage with Canada, Cape Colony and other parts of the British Empire announced.

Sept. 2.—Sir H. Kitchener won great victory at Omdurman in the Soudan and took possession of Khartoum.

Sept. 24.—Occurrence of the Fashoda incident and commencement of prolonged controversy with France.

Nov. 4.—Lord Salisbury announced French evacuation of Fashoda.

1899.

Feb. 6.—Sir H. Campbell-Bannerman elected Leader of the Liberal Party.

April 6.—First elections under Irish Local Government Act resulted in return of 546 Nationalist County Councillors and 113 Unionists.

May 2.—Mr. Cecil Rhodes explained, in London, his financial proposals for completion of the Cape to Cairo Railway.

June 5.—Conference at Bloemfontein, S. Africa, between President Kruger and Sir A. Milner broke up after the former had claimed complete independence of British control or suzerainty.

Sept. 8.—The British Government took the definite ground that the Transvaal was not a 'sovereign international state.'

Oct. 3.—The Paris Arbitration Tribunal on the Venezuelan question awarded Great Britain the greater part of its territorial claims.

Oct. 9.—The Transvaal addressed a war ultimatum to British Government; Parliament voted £10,000,000 sterling on 17th for war purposes; the battle of Glencoe on 20th commenced the war. The siege of Ladysmith commenced; General Buller was defeated at Colenso (Dec. 15); Roberts and Kitchener were sent out (Dec. 16).

1900.

Jan. 23.—Defeat of Buller at Spion Kop; Kimberley relieved Feb. 15; Cronje surrendered at Paardeburg Feb. 27; Ladysmith relieved Feb. 28; Roberts entered Pretoria June 5.

March 27.—Australian delegates in London settled details of Bill confederating the Australian Colonies into a united Commonwealth.

Oct. 25.—Royal Proclamation issued annexing the Transvaal; the Orange Free State previously annexed by a proclamation of Lord Roberts on May 29.

1901.

Jan. 22.—Death of Queen Victoria and accession of King Edward VII.

March 9.—Details issued of Mr. Brodrick's scheme for reorganization of British Army.

March 16.—The Duke and Duchess of Cornwall and York left England upon a tour of Australia and Canada.

July 30.—A Bill passed Parliament extending the King's title to include all "British Dominions beyond the seas."

1902.

Jan. 30.—Treaty of Alliance signed between Great Britain and Japan.

March 26.—Death of Rt. Hon. Cecil J. Rhodes.

May 31.—After many months of irregular fighting and guerrilla warfare the Boer leaders signed a treaty of peace at Vereeniging with Lords Milner and Kitchener.

June 24.—The serious illness of the King postponed Coronation.

June 30.—Colonial Conference opened in London.

July 11.—Lord Salisbury retired from Premiership of Great Britain and was succeeded by Mr. A. J. Balfour.

Aug. 9.—The Coronation of King Edward took place at Westminster Abbey.

Oct. 31.—The last link of the British Pacific Cable completed.

Nov. 25.—Mr. Chamberlain left Great Britain upon an official visit to South Africa.

Nov. 8.—The German Emperor William II, arrived on a visit to Great Britain.

Dec. 9.—Combined German and British action regarding claims against Venezuela proved a most unpopular political action.

1903.

Jan. 24.—Alaskan Boundary treaty with United States signed at Washington.

Feb. 2.—A prolonged Nonconformist agitation against payment of rates under new Education Bill commenced.

May 1.—King Edward paid a most popular visit to France.

Aug. 22.—Death of the Marquess of Salisbury.

Aug. 25.—Commonwealth of Australia Parliament voted £200,000 a year to British Navy.

Sept. 9.—Mr. Chamberlain retired from Balfour Government.

Oct. 6.—Mr. Chamberlain opened at Glasgow his campaign in favor of fiscal reform and Empire tariff preferences which continued through the elections of 1906 and into 1907.

Oct. 20.—Alaska Boundary Award made public.

1904.

Feb. 1.—War Office Reconstruction Committee reported a series of proposed reforms.

April 8.—An Anglo-French agreement signed at London settled outstanding questions in Newfoundland, West Africa, Egypt, Morocco, Siam, Madagascar and New Hebrides.

March 31.—Tibetan war commenced by an attack of natives on British mission. Treaty concluded Sept. 7.

June 25.—King Edward visited German Emperor at Kiel.

July 12.—Anglo-German Arbitration Treaty signed.

Oct. 22.—Russian Baltic squadron committed extraordinary outrage upon British fishing fleet in the North sea. Russian Government apologized and a Commisssion of Inquiry held at Paris reported (1905, Feb. 25,) in a compromised form and £65,000 indemnity was paid to Great Britain.

1905.

April 25.—Terms of the new Transvaal constitution officially announced.

June 12.—Lord Roberts issued an appeal for the general formation of Rifle Clubs.

Aug. 7.—The French fleet officially welcomed by the King on its visit to British waters and reviewed, with the British fleet, on Aug. 9.

Dec. 4.—Mr. Balfour retired from the post of Prime Minister and Sir H. Campbell-Bannerman was called to form a Liberal Cabinet.

1906.

Jan. 8.—The King dissolved Parliament, and the elections resulted in a remarkable Liberal victory with a majority of 104 over all parties and with 50 Labor members also returned.

Feb. 7.—The Duke and Duchess of Connaught, during their tour of South Africa, reached Pretoria.

March 19.—The Prince and Princess of Wales leave Karachi for Great Britain after a magnificent tour of India.

March 21.—The Liberal Government refused to support a straight vote of censure upon Lord Milner's South African administration.

March 29.—The Government precipitated a controversy with that of Natal over the proposed execution of Native Rebels.

May 6.—The Liberal Education Bill, which had already stirred up Church of England interests, was the object of protest from a great Roman Catholic mass-meeting in London.

May 31.—The marriage of Princess of Ena of Battenburg to the King of Spain.

July 1.—Chamberlain's 70th birthday, celebrated at Birmingham.

GREAT BRITAIN.

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GREAT BRIT'AIN, Royal Arms of: heraldic device borne by the sovereigns of the United Kingdom of Great Britain and Ireland. The royal arms are borne thus:

Royal Arms of Great Britain.

Almost before the earliest dawnings of hereditary coat armor, the sovereigns of England, in common with various other monarchs of Christendom, adopted the lion as their device. Richard I., in his earliest seal, has two lions, which are borne counter-rampant; but in the latter part of his reign, the great seal of Cœur-de-Lion represents the three lions in pale and passant gardant, as they have been almost uniformly depicted since. In 1340, Edward III. assumed the title of king of France, and quartered the arms of France with those of England. Mary, on her marriage with Philip II., impaled the arms of Spain and England.

James VI. of Scotland, succeeding to the throne of England, quartered the arms borne by the preceding sovereigns with those of Scotland and Ireland, the first and fourth quarters being France and England quartered as before, the second quarter the lion rampant of Scotland, within the double tressure (see Scotland, Arms of), and the third quarter the harp of Ireland (see Ireland, Arms of). The royal arms were similarly borne by all the sovereigns of the House of Stuart till the reign of Anne, except that William III. bore over all the coat of Nassau on an escutcheon of pretense.

After the legislative union with Scotland in the reign of Anne, England and Scotland impaled were placed in the first and fourth quarter, France in the second, and Ireland in the third. The accession of George I. displaced England and Scotland from the fourth quarter to make way for the arms of his majesty's German dominions. On the union with Ireland, George III. laid aside the titular assumption of king of France, and abandoned the French ensigns. The arms of England were now made to occupy the first and fourth quarter, Scotland the second, and Ireland the third, while the German ensigns were relegated to an escrutcheon of pretense. These last were finally abandoned on the severance of Hanover from the crown of Great Britain at the accession of Victoria 1837.

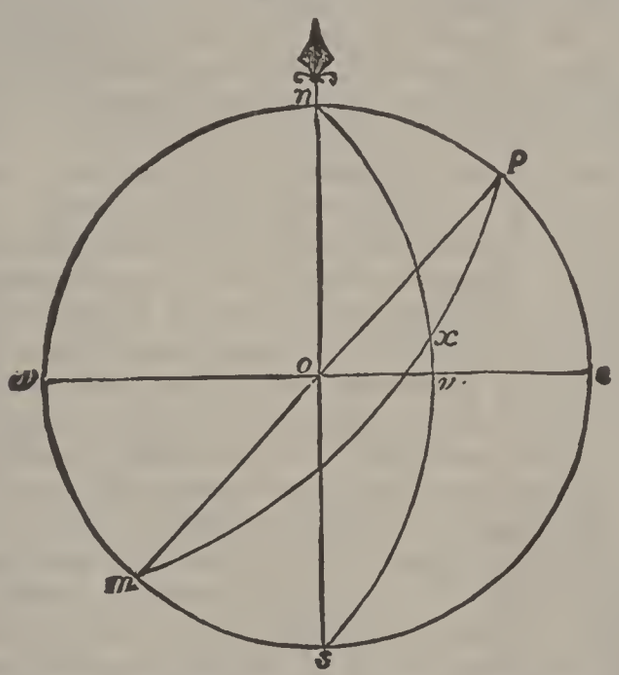
From the union of the crowns of England and Scotland under James I., till the union of the kingdoms 1707, the royal arms were somewhat differently marshalled in Scotland, Scotland being allowed in all Scottish seals, ensigns, and arms to occupy the first and fourth quarter, and England the second, while the whole were ensigned with the crown of Scotland; but the Act of Union 1707 recognizes no royal ensigns but those of the United Kingdom, which are to be 'such as her majesty shall think fit;' and by 39 and 40 Geo. III. c. 67, on the union with Ireland, it was enacted that the armorial bearings of the United Kingdom 'shall be such as his majesty by his royal proclamation under the Great Seal of the United Kingdom shall be pleased to appoint.' The practice, which prevails to a certain extent in Scotland, of giving the precedence to the Scottish lion in the royal shield, is incorrect.

The lion passant as the *crest* of England first appears on the great seal of Edward III.

The *supporters* borne in former times by the kings of England varied much, particularly during the early period when these appendages of the shield were invested with more of a decorative than a heraldic character, and perhaps often left to the fancy of the engraver. When the arms of any of the English sovereigns from Richard II. to Edward IV. are represented with supporters, the animals selected are almost indifferently lions, antelopes, or white harts, and occasionally their place is supplied by angels. Edward IV.'s shield is sometimes supported on one side by a black bull, and Richard III.'s in one instance—in a MS. in the British Museum—on both sides by white boars. During the reigns of Henries VII. and VIII., Edward VI., Mary, and Elizabeth, the lion, red dragon, and greyhound were the supporters most in vogue, and as the herald or engraver had it not in his power to represent all three at once, he seems to have been allowed to select any two at pleasure. James I. for the first time clearly defined the royal supporters, adopting the lion of England and unicorn of Scotland as they have ever since been borne.

GREAT CIRCLE SAILING.

GREAT CIR'CLE (or TANGENT) SAILING: navigation on a line coincident with a great circle of the earth. To have a clear idea of the advantages of great circle sailing it is necessary to remember that the shortest distance between two places on the earth's surface is along an arc of a great circle (see SPHERE); for instance, the shortest distance between two places in the same latitude is not along the parallel of latitude, but along an arc of a circle whose plane would pass through the two places and the centre of the earth. The problem, then, in great circle sailing, is to determine what the course of a ship must be in order that it may coincide with a great circle of the earth, and thus render the distance sailed over the least possible. This problem may be solved in two ways, either by means of an instrument called the 'spherograph,' or by the computation of a spherical triangle. For the first of these



methods, see SPHEROGRAPH. The method by computation will be understood from the accompanying diagram: *nwse* represents a meridian which passes through the place *p*, *nxvs* another meridian through the place *x*, and *pxm* a portion of a great circle; let *p* be the place sailed *from*, and *x* the place sailed *to*, then *px* is the great circle track; and it is required to determine the length of *px* (called the distance), and the angle *xpe* which it makes with the meridian (called the course). To determine these two, we have three things: *nx*, the co latitude of *x*; *np*, the co-latitude of *p;* and the angle *xnp*, which, measured along *ve*, gives the difference of longitude. The problem thus becomes a simple case of spherical trigonometry, the way of solving which may be found in any of the ordinary treatises on spherical trigonometry.

From the theory of great circle sailing, the following most prominent features are at once deduced: *A ship*

sailing on a great circle makes straight for the port, and crosses the meridians at an angle which is always varying, whereas, by other sailings, *the ship crosses all meridians at the same angle*, or, in nautical phrase, *her head is kept on the same point of the compass, and she never steers for the port direct till it is in sight.* As Mercator's chart (q.v.) is the one used by navigators, and on it the course by the ordinary sailings is laid down as a straight line, it follows, from the previous observations, that the great circle track must be represented by a curve, and a little consideration will show that the latter must always lie in a higher latitude than the former. If the track is in the northern hemisphere, it lies nearer the north pole; if in the southern hemisphere, it is nearer the south pole. This explains how a curve-line on the chart represents a shorter track between two places than a straight line does; for the difference of latiture is the same for both tracks and the great circle has the advantage of the shorter degrees measured on the higher circles of latitude. Consequently, the higher the latitude is, the more do the tracks differ, especially if the two places are nearly on the same parallel. The *point of maximum separation*, as it is called, is that point in the great circle which is furthest from the rhumb-line on Mercator's chart. Since the errors of dead-reckoning prevent a ship from being kept for any length of time on a prescribed track, and thus necessitates the calculation of a new path, in practice, the accurate projection of a great circle track on the chart would be a waste of time. In general, it is sufficient to lay down three points—the place sailed from, the place sailed to, and the point of maximum separation, and through these points to draw an arc of a circle. As the rhumb-line and great circle track between two places, one in north latitude and the other in south latitude, cross each other at the equator, in this case there will be two *points of maximum separation*, and the course and distance must be calculated for each side of the equator separately. Many ignorantly object to great circle sailing on the ground that, on account of constant change of bearings, a ship cannot be navigated on the correct course; but, in fact, all that is required of a navigator is to sail as near to his great circle track as convenient; and each separate course will be a tangent to his track, and the shorter these tangents are made, the more will the length of a voyage be diminished. A chart constructed on the *Gnomonic Projection* (q.v.) represents all great circle tracks as straight lines. See NAVIGATION.

GREAT-CRESTED FLYCATCHER: a large flycatcher (*Myiarchus crinitus*), which is a summer visitor to all parts of temperate North America, and is noted for its shrill, yet musical scream, and for its habit of entwining one or more cast-off snake-skins in its large tree-lodged nest. It is olive-brown above, with an ashy

head surmounted by a tall brownish crest, and the lower parts delicate yellow. Several other species belong to the southwestern States and Mexico, and are often called crested kingbirds.

GREAT DANE: a breed of large, smooth-coated dogs, the modern equivalent of the ancient boar-hound. See DOG.

GREAT EAST'ERN: when built, largest ship afloat; designed by I. K. Brunel, and was launched at Millwall on the Thames, Eng., 1858. In 1860 the Great Eastern crossed the Atlantic to New York in 11 days. During the remainder of 1860, and the greater part of 1861, she made many voyages to and fro, but could not pay expenses and constantly required repairs. Her dimensions were: length, 680 ft. between perpendiculars, or 692 ft. upper deck; breadth, 83 ft., or 118 over paddle-boxes; height of hull, 60 ft., or 70 to top of bulwarks; bottom flat for 40 ft. in width, without keel. The propelling power comprised both paddle and screw. The paddle engines had 4 boilers, each with 400 brass flue-tubes; there were 4 engines, with cylinders of 14 ft. stroke. The screw engines had 6 boilers; the 4 engines had cylinders each 4 ft. stroke by 84 in. diameter, with piston-rods 7½ in. thick; propeller-shaft 160 ft. long, with a screw propeller at one end 24 ft. in diameter. The coal-bunkers had a capacity of 14,000 tons. The engines combined were estimated to work up to 11,000 horse-power. There were 6 masts, 5 of them iron, carrying 7,000 yards of sail as auxiliary to the steam-power. The vast wall-sided compartments of the ship had facilities for conversion into cabins for 800 saloon passengers, 2,000 second-class, 1,200 third-class, and 400 officers and crew. From 1869 onward the Great Eastern found a good use in laying some of the most important telegraphic cables—across the Atlantic, in the Mediterranean, in the Red Sea, across the Indian Ocean, across the equator from Europe to Brazil, etc. In 1884 she became a coal-hulk at Gibraltar, and after being exhibited as a curiosity at different English ports was sold, 1888, at Liverpool to be broken up.

GREATEST HAPPINESS THEORY. See ETHICS AND HEDONISM.

GREAT FALLS, Mont., city, county-seat of Cascade County; on the Missouri River, the Great Northern, and the G. F. & C. Railways; 120 miles northeast of Butte. South and nearby is a great mining region and north is an agricultural and grazing section. It has large gold, silver, and copper smelters, and bituminous coal, lead, iron, and sandstone are found in the vicinity. The excellent water power which the city possesses is an inducement to manufacturers to establish works in Great Falls. There are a number of falls here; one, Great Falls, gives name to the city. The first settlement was made in 1884, and in 1888 Great Falls was incor-

porated. Its rapid growth has been largely the result of its natural resources. Its chief manufactures are flour, furniture, mining and agricultural instruments, wagons, carriages, and woolen goods. The population increased from (1890), 3,979 to (1910) 13,948.

GREAT FISH RIVER: in Cape Colony stream in s. Africa; rising in the Snowy Mountains; and, after a generally s.e. course of 230 m., entering the Indian Ocean, lat. 33° 25′ s. and long. 27° e., having at its mouth a bar, which renders it inaccessible to any decked vessel.

GREAT FISH RIVER, or BACK'S RIVER: stream in British America entering an inlet of the Arctic Ocean in 95° w. long. after passing through Lake Pelly. See BACK, SIR GEORGE.

GREAT GRIMSBY. See GRIMSBY, GREAT.

GREAT KANAWHA, *ka-naw'wa:* affluent of the Ohio river, called New river in the upper part of its course. It rises in the n.w. of N. C. between Blue Ridge and Iron Mountains; flows n.e. more than 100 m. between parallel mountain ranges; then turning n. and w., breaks through several ridges of the Alleghanies, and continues n.w. to its junction with the Ohio at Point Pleasant after a course in all of abt. 400 m. About 100 m. from its mouth, where it is joined by the Gauley river, it takes the name Great Kanawha; and 2 m. lower it has a picturesque fall of abt. 50 ft. It is navigable up to this fall.

GREAT MEADOWS, Pa., Engagement at, 1754, May 28; Washington's first fight. When the French built Fort Duquesne (now Pittsburg), driving off an English force which had begun to fortify the same spot, it was evident that the decisive struggle for mastery of the American hinterland was to begin; and the commander of the nearest English force, a Virginia militia officer of 22, named George Washington, at once sent a messenger to Gov. Dinwiddie and wrote letters to the governors of Pennsylvania and Maryland, urging all to send troops and expel the French. Meantime he set out with his force to build a fort on the Monongahela where Brownsville, Pa., now stands. Constructing a road as he went, he halted at the Great Meadows of the Youghiogheny, a bushy field at the foot of Laurel Hill,—a good camping-place and defensible position. Hearing from his scouts that the French had learned of the English activity, and sent out a party to engage any English band they met, he cleared the field of bushes and threw up an intrenchment behind a ravine crossing the field; but instead of waiting an attack, took 40 men for a night surprise of the French, guided by Indian allies. It was raining hard, the path was often lost, and he did not reach the French camp till morning. They were an advance party of 32, sent out to reconnoitre and, hearing of Washington's advance,

they had hidden in a rocky hollow and sent back for reinforcements, but attempting defense when surprised, the commandant—Ensign Jumonville—and nine men were killed, and the rest captured and taken to the camp at Great Meadows. Washington lost one killed and three wounded. The sequel is told under FORT NECESSITY.

GREAT PEDEE RIVER, *grāt pē-dē' rĭv'ẽr:* formed in N. C. by the Rocky and Yadkin rivers, flows s.s.e. into S. C., and enters Winyaw Bay in Georgetown co. The lower part of it is locally known by the name of one of its affluents, the Waccamaw, and its chief tributary is the Little Pedee, which also is formed by two streams in N. C. The Great Pedee is navigable for steamers to Gardner's Bluff, and sloops can ascend it 120 miles.

GREAT SALT LAKE: remarkable and extensive body of water, in the n. of Utah State; giving name to Salt Lake City (q.v.), the Mormon metropolis, which is 12 m. from its s.e. extremity. The lake lies in one of the great valleys or basins of the Rocky Mountains, and is about 70 m. long and 30 m. broad, yet its average depth is only seven or eight ft., and it nowhere exceeds a depth of 33 ft. Its surface is 4,200 ft. above sea-level. In the middle of the lake, several islands rise abt. 3,250 ft. above the level of the water; the principal island is in lat. 41° 10′ n., and long. 112° 21′ W. The islands are 9 in number, one is 12 m., another 16 m. in length. The water of the lake is so salt as to form one of the purest and most concentrated brines known in the world; and contains 22 per cent. of chloride of sodium, slightly mixed with other salts. It is refreshing to bathe in and singularly buoyant; but the swallowing of a mouthful causes strangulation, and a drop in the eye raises acute pain. Several species of insects and a crustacean (*Artemia*) have been found in its waters, but no fishes. Vast flocks of gulls, ducks, and geese frequent the shores. The country around is mostly very desolate. The lake receives from the s., by the Jordan, the waters of the Utah Lake, which are fresh, and those of the Bear river from the n.; but it has no outlet. In the quality of the water, and the wild desolate scenery around, it resembles the Dead Sea. The first mention of the Great Salt Lake was by La Hontan, 1689, who heard of it from the Indians. It was first explored and described, 1843, by Col. Fremont. A thorough survey was made 1849–50, by Capt. Howard Stansbury, U.S.A., whose report was printed 1852. See SALT LAKE CITY; UTAH.

GREAT SEAL: principal seal of a nation or of a state, on which is engraved some device formally adopted by the government (in a monarchy the effigy, style, and titles of the reigning sovereign)—an impression from which in wax on a document gives the document an official authority. By Act of Union between England

and Scotland (5 Anne, c. 8), one Great Seal for the United Kingdom of Great Britain is used for sealing writs to summon the parliament, for treatises with foreign states, and all public acts of state affecting Great Britain: the holder of the Great Seal is now generally called the Lord Chancellor. A seal is also kept in Scotland for sealing grants and writs affecting private rights there. As regards Ireland, the Act of Union, 39 and 40 Geo. III. c. 67, provided that various acts as to summoning parliament, etc., should be done under the Great Seal of the United Kingdom; but in other respects, the Great Seal of Ireland is used in the same manner as before the union.

GREAT SLAVE LAKE: extensive and irregular body of water in the Canadian n.w. territory; lat. 60° 40′—63° n., long. 109° 30′—117° 30′ w.; greatest length about 300 m., greatest breadth 50 m. It is surrounded, especially on the n., by rugged and precipitous shores; it contains many islands, some wooded, and is wholly frozen over for six months of every year. On the n. it receives the surplus waters of Lake Aylmar and Lake Artillery; and by the Slave river on the s., it receives the surplus waters of Lake Athabasca; and it discharges by the Mackenzie river into the Arctic Ocean.

GREAT SLAVE RIVER: in British N. America, the outlet from Lake Athabasca into Great Slave Lake, flowing in a n.w. direction from the former to the latter. It is about 210 m. in length; its banks in many parts are well wooded; and its course, which in the upper part is interrupted by falls and rapids, is through an alluvial region in the lower part.

GREAT WALL OF CHINA. See CHINESE EMPIRE.

GREAVE, n. *grēv:* in *OE.*, a grove, which see; a groove or depression in the earth.

GREAVES, n. plu. *grēvz* [Norm. F. *grève*, the shin or shinbone: Sp. *grevas;* OF. *greves*, boots, greaves]: pieces of armor formerly used as a defense for the legs. They were originally made of leather, quilted linen, etc.; afterward of steel, hollowed to fit the front of the legs, and fastened with straps behind.

GREAVES, n. *grāvz:* see GRAVES; the sediment of melted tallow; dog's food.

GREBE, n. *grēb* [F. *grèbe;* W. *crib;* Corn. *yriban*, a comb, a crest]: name for various species, (or, according to some writers, genera) of birds of the family *Podicipedidæ*, having the feet webbed not in the usual manner, but by a separate membrane for each toe, united only at the base. Two genera, however, are generally conceded as sufficiently defined, *Podiceps* and *Centropelma*. The tarsi (shanks) are so much compressed as to be almost like blades. The claws are large and flat. The bill is about as long as the head, straight and conical. The wings are short. There is no tail. The

legs are attached so far back that the birds when on land assume an erect position, like penguins.

GRE'CIAN GAMES. See OLYMPIC GAMES; PYTHIAN GAMES; ISTHMUS.

GRECQUE, n. *grĕk* [F. fretwork]: apparatus placed in coffee-pots for holding the coffee-grounds. Hot water poured on the coffee, carries strength and aroma through the perforated bottom, without the grounds; also a coffee-pot furnished with a grecque.

GREE, n. *grē* [Gael. *grith*, knowledge, pre-eminence]: in *Scot.*, pre-eminence; superiority.

GREE, n. *grē* [F. *gré*, will, inclination, taste—from It. *grato*, will, inclination—from mid. L. *grātum*, will, pleasure]: in *OE.*, goodwill; favor.

GREE, n. *grē* [L. *grădus*, a step]: in *OE.*, a degree; a step; a stair.

GREECE, *grēs:* kingdom in Europe; in the southern part of the most easterly peninsula on the n. shore of the Mediterranean. *Ancient Greece* was bounded on the north by Macedonia and Illyria; on the east and southeast by the Ægean and Myrtoan, and in the west, and southwest, by the Ionian seas. Its length from the borders of Macedonia to Cape Tænarum was about 262 miles. The name of *Græcia* originated in Italy, and was probably derived from Pelasgian colonists, who, coming from Epirus to Magna Græcia, in southern Italy, and calling themselves *Græci*, occasioned the application of this name to all the people who spoke the same language with them. In earlier times, for example, in the time of Homer, Greece had no general name among the natives. Aristotle was the first Greek to call his countrymen Τραικοί, Greeks. It afterward received the name of *Hellas*, and still later, after the country was conquered by the Romans, it was divided into two provinces: the Peloponnesus being known as Achaia, and the remaining regions to the north as Macedonia. The Grecian tribes were so widely dispersed that it is difficult to determine with precision the limits of Greece, properly so called. The name perhaps is properly applied only to the country lying to the south of Macedonia, with the adjacent islands; but it has sometimes been given in a modern sense by geographers to the whole territory lying to the south of Mount Hæmus, Mount Scomius, and the Illyrian Alps, or the whole series of mountains now called the Balkan, so as to include regions inhabited by some Thracian, Macedonian, and Illyrian tribes. The area of the mainland of the more limited region to which the name of Hellas is properly confined is above 55,000 square miles. The whole of Greece naturally divides itself into three parts: Northern Greece, including Epirus and Thessaly; Central Greece, which comprises what is known as Hellas; and the Peloponnesus. *Modern Greece* is bounded on

the north by Turkey, and on all other sides by the sea —the Ionian Sea on the west, the Mediterranean proper on the south, and the Ægean Sea on the east. The mainland forms two chief portions, united by the narrow Isthmus of Corinth; a northern, called Northern Greece or Livadia, and a southern peninsula, called the Peloponnesus of Morea. By far the largest island is Eubœa, only separated from the mainland of Livadia by the narrow channel of Euripo. The other islands form several groups: The northern Sporades on the northeast of Eubœa including Skiathos, Skopelos, Khiliodromia, Pelagonisi, Sarakinon or Peristeri, and Skyros; the western Sporades, chiefly in the Gulf of Egina, or between it and the Gulf of Nauplia, including Hydra, Septsæ, Poros, Egina, and Salamis or Koluri, the Cyclades; and the Ionian Islands. The capital and largest town is Athens.

The Islands.—The islands of Greece are partly scattered over the Ægean Sea and partly contained in the Ionian Sea on the southwest of the mainland. The Greeks applied the names Cyclades and Sporades to two groups of islands in the Ægean, the former name (from *kuklos*, a circle) to those which they believed to form a circle round the sacred island of Delos, and the latter (from a Greek root meaning scattered, Sporadic) to those which were scattered over various parts of the sea. Some islands were sometimes said to be in the one group and sometimes in the other, and several were sometimes excluded from both. The following, however, are the principal of those which may most properly be considered as belonging to the Cyclades: Andros, Tenos, Myconos, Naxos (now Naxia), Paros (celebrated for its marble), Amorgos, Anaphe, Thera (now Santorin), Pholegandros (now Polykandro), Sicinos, Ios (now Nio), Melos, Syros, and Gyaros (Jura), Siphnos, Seriphos, Cythnos, and Ceos. The name Sporades may be applied to all the other islands in the Ægean. The Sporades will thus include the following islands on the northeast of the mainland of Greece: Eubœa (Negropont), the largest of all the Greek islands, separated from the continent only by the narrow strait of Euripus, and containing the ports of Chalcis and Eretria; Sciathos, Scopelos, Halonesus (Kilidromi), Eudemia (Sarakino), and Scyros; the following off the coasts of Thrace and Asia Minor: Lemnos, Thasos, Imbros, and Samothrace (in very remote times the seats of a mysterious religious worship), Lesbos (with the flourishing and luxurious town of Mitylene), Chios, Samos, Cos, etc.; and the following in the Saronic Gulf, or between it and the Argolic Gulf: Salamis (now Salamis or Koluri), Ægina, Calauria (Poros), Hydrea (Hydra), and Pityussa (Spetsæ). The islands in the Ionian Sea are Corcyra (Corfu), celebrated in the most ancient times for its wealth and culture, and at a later period colonized by Corinthians; Paxos, Leucas

TURKEY IN EUROPE,
SERVIA, ROUMANIA, BULGARIA,
GREECE AND MONTENEGRO.
SCALE OF STATUTE MILES.
0 50 100 150 200
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Longitude East from Greenwich.
20°
25°
30°
45
40°
RUSSIA
MOLDAVIA
BUKOWINA
Botuschany
Szigeth
Bistritz
Maros
Karlsburg
Piatra
Roman
Bakau
Jassy
Hushi
Skuleni
Ananiev
Kishenev
Tiraspol
Odessa
Leova
Berlat
Kagul
Akerman
Bolgrad
Galatz
Ismail
Mouths of the Danube
Tultcha
Hirsova
Kustendje
Mangalia
C. Kaliakra
Varna
Misivri
Burghas
Tirnova
Midia
Kilia
Bosporus
Scutari
Rodosto
SEA OF MARMORA
Brusa
Dardanelles
Galata
Kirk Kilisseh
Adrianople
CONSTANTINOPLE
Demotika
Feredjik
Enos
Gallipoli
Samothraki
Imbros
Thasos
Lemnos
Mitylene
Rhelidromi
Skopelos
Skyro
Euboea
Chalcis
Negropont
Scios
Smyrna
Samos
Andros
Nicaria
Tinos
Mykonos
Paros
Naxos
Amorgus
Astropalia
Polykandro
Santorin
Anaphi
Rhodes
Nios
Milo
Serpho
Siphanto
Thermia
Zea
Syra
Colonna
Nauplia
Argos
Tripolitza
Sparta
Gulf of Arcadia
Strivali
Zante
Kephalonia
Corfu
Parga
Janina
Delvino
Avlona
Brindisi
Otranto
Durazzo
Elbassan
Scutari
Antivari
Cattaro
Ragusa
Novibazar
Ushitza
Valievo
Serajevo
Svornik
Semlin
Pancsova
Belgrade
Semendria
Krugushevatz
Krushevatz
Nish
Pirot
Leskovatz
Sofia
Pristina
Prisrend
Uskub
Istib
Prilip
Monastir
Kastoria
Veria
Mt. Olympus
Salonika
Doiran
Demir Hissar
Gumurjina
Seres
Kavala
Tatar Bazardjik
Philippopolis
Eski Saghra
Tundja
Selimno
Lovtcha
Tirnova
Sistova
Nicopoli
Plevna
Rustchuk
Rasgrad
Shumla
Silistria
Giurgevo
Karakal
Widin
Krajova
Slatina
Pitesti
Ploesci
Bukharest
Tirgochil
Romnik
Kronstadt
Sokchany
Brahilov
Transylvanian Alps
Aluta River
Karlsburg
Maros
Bistritz
Szigeth
Hungary
Austria
Essegg
Brod
Nensatz
N. Becskerek
Temes R.
Drina
Bosna R.
Serajevo
Ragusa
Cattaro
Montenegro
Cetigne
Novibazar
Serbia
Rumania
Bulgaria
Eastern Roumelia
Turkey
Turkey in Asia
Greece
Morea
Ionian Sea
Ionian Isles
Strait of Otranto
Adriatic Sea
Mediterranean Sea
Ægean Sea
Archipelago
Black Sea
Mendere R.
Gulf of Nauplia
Gulf of Marathonisi
Gulf of Corinth
Gulf of Salonika
Gulf of Contessa
Mt. Olympus
Pindus Mts.
Larissa
Volo
Trikhala
Arta
Lepanto
Zeitun
Patras
Zante
Argos
Tripolitza
Sparta
Gallo
C. Matapan
C. Malia
Cerigo
Athens
Chalcis
Rhodes
R., McN. & CO., ENGR'S, CHI.

or Leucadia (Santa Maura), at one time connected with the mainland; the "rocky" Ithaca (now vulgarly called Ithaki), the home of Ulysses; Cephallenia (Cephallonia), Zacynthus (Zante), and Cythera (Cerigo), one of the seats of the worship of the goddess Aphrodite.

Physical Features.—The first thing which strikes the eye on looking at a map of Greece is the comparatively great extent of its coast-line, formed by numerous gulfs which penetrate into it in all directions, and give it a remarkably broken and rugged appearance. Proceeding round the coast from the northwest to the northeast we are presented in succession with the Ambracian Gulf (now Gulf of Arta), Corinthian Gulf (the mouth of which is now called the Gulf of Patras, while the name of Gulf of Corinth is reserved for the inner part of it), the Cyparissian (now Arcadian) Gulf, and the Messenian, Laconian, Argolic, Saronic, Maliac, and Pagasæan gulfs, now called respectively Koron, Marathon, Nauplia, Athens, Lamia, and Volo. The Corinthian Gulf on the east, and the Saronic Gulf on the west, which nearly meet at the Isthmus of Corinth, divide Greece into a continental and a peninsular portion, the latter called the Peloponnesus (now Morea). Another striking feature is the mountainous character of the interior. The whole country was bounded on the north by a range of mountains, the western half of which was called Mount Lingon and the eastern half the Cambunian Mountains, with Mount Olympus at their eastern extremity. From about the middle of this range a lofty chain, called Mount Pindus, strikes southward and runs almost parallel to the eastern and western coasts of Greece. At a point in this chain called Mount Tymphrestus or Typhrestus (now Mount Velukhi), two chains proceed in an easterly direction, the northernmost of which, Mount Othrys, runs almost due east, and attains at some points a height of from 7,000 to 8,000 ft., while the southern one runs rather in a southeasterly direction, attaining at one point a height of 8,240 ft., and terminates at the celebrated pass of Thermopylæ. The Cambunian Mountains on the north, the range of Pindus on the west, and Othrys on the south, enclose the large and fertile vale of Thessaly, forming the basin of the Peneus (now Salambria), and the ranges of Othrys and Œta enclose the smaller basin of the Sperchius (Hellada). Another range of mountains branches off from Mount Œta and runs still more to the south. This is the celebrated Parnassus, which, at its highest point, exceeds 3,000 feet. The peaks of Cithæron, Parnes, Pentelicus, and Hymettus lie in the same direction, but are more distinguished for their classic celebrity than for their height. The range in which these peaks are found is continued to the southeast point of continental Greece, and the islands of Ceos, Cythnos, Seriphos, and Siphnos (now Kea, Thermia, Serpho, and Siphanto) may be regarded as continuations of it. This range

on the south and that of Œta on the north enclose the basin of the Cephissus, with Lake Copias (now Topolia). Another chain of mountains strikes southwestward from the central range of continental Greece, under the names of Corax and Taphiassus. The chief rivers on the west side of the Pindus chain are the Arachthus (now Arta) and the Achelous (now Aspropotamo).

The chief features in the mountain system of the Peloponnesus is a range or series of ranges forming a circle round the valley of Arcadia in the interior, having a number of branches proceeding outward from it in different directions, dividing the rest of the Peloponnesus into several other valleys. The loftiest part of the mountainous circle round Arcadia is that lying to the north, with the peak of Cyllene (Ziria), 7,789 ft. high, at its eastern extremity, and Erymanthus (Olonos), 7,297 ft. high, at its western. The southern part consists rather of a series of heights than a chain of mountains. The highest range which branches off from the circle around Arcadia, and, indeed, the highest range in the Peloponnesus, is Mount Taygetus (Pentedactylon), which strikes southward, separating the ancient divisions of Messenia and Laconia, and terminating in the promontory of Tænarum (now Cape Matapan). The other chains are of no importance. The only rivers in the Peloponnesus of any consequence are the Eurotas (Iri), draining Laconia on the southeast; the Pamisus (Pirnatza), draining Messenia on the southwest; the Alpheus (Ruphia), draining Arcadia and Elis; and the Peneus (Gastuni) draining Elis on the west.

Ancient Divisions.—On the northwest of the mainland of Greece was the mountainous region of Epirus, which was never more than half Greek; and to the east of that district, separated from it by the chain of Pindus, lay Thessaly, a region of fertile plains. To the south, lay a series of small independent states. Reckoned from west to east, there were Acarnania, Ætolia, Doris and Locris, Phocis with Mount Parnassus, the seat of the Muses, and the sacred Delphi, regarded by the Greeks as the navel of the earth; Bœotia, with Helicon, another mountain sacred to the Muses, and with the cities of Thebes and Platæa; Megaris, containing the city of Megara; and Attica with its capital Athens, Piræus, the port of Athens, and the city of Eleusis, the seat of the mysterious worship of Demeter. In the middle of the Peloponnesus was Arcadia, with the towns of Mantinea, Tegea, and Megalopolis, the last founded by Epaminondas. In the north lay Sicyon and Corinth, the latter situated on the isthmus connecting the Peloponnesus with the rest of Greece; and to the west of that Achaia. To the southwest of Achaia lay the rich province of Elis, with the plain and sacred grove of Olympia, celebrated on account of the Olympic games, which were held here every fourth year. To the south of Elis in the southwest cor-

ner of the Peloponnesus, lay the province of Messenia, with the famous stronghold of Ithome, one of the horns of the Peloponnesus, the fort of Pylos, and later the capital town of Messene, founded by Epaminondas 369. Separated from Messenia by the range of Taygetus was the province of Laconia, occupying the southeast corner of the Peloponnesus, and containing the renowned city of Sparta, long the rival and ultimately the conqueror of Athens. Lastly, to the north of Laconia, the east of Arcadia, and the south of Sicyon, lay the province of Argolis, with the capital Argos, and the cities of Mycenæ and Tiryns, all remarkable for the remains of gigantic works of masonry, commonly known as Cyclopean works.

Modern Divisions.—Greece is politically divided into 16 nomarchies, which are again divided into eparchies, and these again into demes. The followng table gives the names of the nomarchies, with the area of each of them, and the population:

Nomarchies		Area in sq. m.	Pop.
Northern Greece:	Attica and Bœotia	2,472	313,069
	Phocis and Phthiotis	2,044	147,297
	Acarnania and Ætolia	3,013	170,565
Peloponnesus:	Argolis and Corinth	1,442	157,578
	Achaia and Elis	1,901	236,251
	Arcadia	2,020	167,092
	Messenia	1,221	205,798
	Laconia	1,679	135,462
Islands:	Eubœa and Sporades	2,216	115,515
	Cyclades	923	134,747
	Corfu	431	124,578
	Zante	277	45,032
	Cephalonia	302	83,363
Thessaly:	Arta	395	39,144
	Trikkala	2,200	176,773
	Larissa	2,478	181,542
	Total	25,014	2,433,806

By the law of 1899, July 17, there was a new division into 26 nomarchies, namely: Attica, Bœotia, Phthiotis, Phocis, Ætolia and Acarnania, Eurytania, Larissa, Magnesia, Trikkala, Karditsa, Arta, Achaia, Elis, Eubœa, Cyclades, Kerkyra (Corfu), Leucas, Kephallenia (Cephalonia), Zacyuthos (Zante). These are subdivided into 69 districts and 442 communes.

Geology and Minerals.—The rock most largely developed in the mountains of Greece is limestone, which often assumes the form of the finest marble. Granite and gneiss are found only in the north, in the eastern ramifications of the Pindus. Tertiary formations prevail in the northeast of the Peloponnesus; and in the northwest, along the shores of Elis, are considerable tracts of alluvium. Volcanic rocks are not seen on the mainland, but form considerable masses in some of

the islands. Greece is not rich in minerals: gold, silver, copper, lead, and iron are found, but the mines have never been worked with zeal. The most famous mines in ancient times were those of Laurium in Attica. Coal is found in Eubœa and in some parts of the Peloponnesus; salt is procured in many districts of Greece and in the Ionian Islands; and marble of the purest kind, and of various colors, may be had in endless supply in almost all parts of Greece. The most famous quarries were in Paros, Carystus (in Eubœo), Pentelicus, and Hymettus. Marble and building-stone were quarried by the old Greeks to a very large extent. There are many mineral springs, both cold and warm, and many caverns still emit those mephitic exhalations which in bygone days quickened the imagination of the poet, and confirmed the superstition of the peasant.

Climate.—The climate of ancient Greece is highly commended by ancient Greek writers, as by Herodotus, Hippocrates, and Aristotle, on which account it seems fair to infer that the malaria which now infests the air in summer did not then prevail to the same extent, a circumstance that is easily accounted for by the fact that in those times the country was more thickly populated and better cultivated. In respect of temperature the same differences resulting from the inequalities of the surface must have existed then as exist now, long and severe winters being experienced in the highlands of the interior, while the lowlands, exposed to the sea, enjoyed warm and genial weather all the year round. In general the first snow falls in October and the last in April. During the summer rain scarcely ever falls, and the channels of almost all the minor streams become dry. The air is then remarkably clear, and a month will sometimes pass away without a cloud being seen. A sudden change, however, takes place toward the end of harvest. Rain becomes frequent and copious; and the streams which had been dried up not only fill their channels, but frequently overflow them, and lay considerable tracts under water. In this way stagnant pools and marshes are occasionally formed, which give rise to intermittent fevers.

Flora and Fauna.—The flora of Greece resembles that of other countries of s. Europe. Among the tame animals of ancient Greece were the horse, mule, ass, ox, sheep, goat, swine, dog. The swine supplied the favorite flesh meat. Of wild animals, were the wolf, bear, boar, and even lions at an early period. Sheep and goats are still very plentiful, and in fact constitute one of the most important sources of wealth to the Greeks. Oxen are much used for plowing, but milch cows are little prized and scarce. At the present day, the wolf, bear, lynx, wild-cat, boar, stag, roebuck, fox, jackal, badger, marten, and many other wild animals are found in the forests. Hares, snipes, wild-ducks, and other game are very abundant; eagles, vultures, hawks, owls, etc., are

found in considerable numbers. The tortoise is very common, but the inhabitants have a great aversion to it.

Soil, Productions, Etc.—Greece was in ancient times more fertile than it is now, which is accounted for by the fact that the forests have been to a large extent cleared away, the springs thus dried up, and the soil deprived of moisture. The most fertile districts were Thessaly, Bœotia, and some parts of the Peloponnesus; the least fertile Attica and Arcadia. The principal objects of cultivation were the vine and the olive, but flax and the commoner cereals were also cultivated more or less. Among the domestic animals were horses, asses, mules, oxen, swine, sheep, goats, and dogs. Swine were very numerous everywhere, and mules were much used in the Peloponnesus; but there were comparatively few horses, as the mountainous character of the country was not conducive to their being reared; the best horses of Greece were reared in Thessaly.

The cultivated land in Greece has recently been estimated at rather more than 5,563,100 acres. There are besides 5,000,000 acres of pasture land, and 3,000,000 acres of waste land. The draining of Lake Copais redeems 60,000 acres of land, which the company divides into holdings of from 5 to 50 acres. English agriculture machinery is being introduced, but still agriculture is in a backward state.

Thessaly is the richest portion of Greece agriculturally. The condition of the agricultural population is said to be very satisfactory. The principal cereal crops are wheat, barley, and maize, but the quantity raised is not sufficient, and much grain is imported. All the fruits of the latitude are grown—figs, almonds, oranges, citrons, melons, etc.—in abundance and of excellent quality, without receiving any great share of attention. The vine also grows vigorously, and considerable quantities of wine are made, some of the sorts being of high quality. But a much more important product of Greece, especially on the coasts of Peloponnesus, and in the islands of Cephalonia, Zante, Ithaca, and Santa Maura, is the Corinthian grape or currant, the export of which has increased in value from $7,558,350 in 1898 to $8,238,118 in 1900. Another important object of cultivation is the olive, for which both the soil and the climate are alike favorable. The culture of the mulberry for the rearing of silk-worms is carried on to some extent. Some good tobacco is grown. The forests contain, among other trees, the oak (*Quercus Ægilops*) which yields the valonia of commerce. The live stock are neither numerous nor of good breeds. The raising of artificial grasses for their maintenance may be said to be unknown, and the scanty herbage which natural pasture affords must be of little avail. Asses and mules are more numerous than horses; cattle are comparatively few; and the chief animals from which dairy produce

is obtained are the sheep and the goat. The quantity of wool produced is considerable, but most of it is of a coarse description.

Manufactures.—The manufactures are limited, but with all other branches of industry in Greece are increasing, and are furthered by high duties on imported goods. The employment of the steam-engine in manufacturing industries dates from about 1868, and is yet only developed to a small extent. Piræus is the chief industrial centre, having spinning and weaving factories for cotton, silk, and wool, machine-shops, paper-works, dye-works, etc. Other centres are Syra, Corinth, Nauplia, Patras, Larissa. Still, cottons and other textiles form by far the most important part of the imports of manufactured goods. Leather manufactures form an important branch of industry. Marble has been worked from the most ancient period in the quarries of the island of Paros. In 1871 the working of the ancient argentiferous lead mines of Laurion in Attica was resumed with good success; and quantities of manganese iron ore and zinc ore are also raised in this district. The most important branch of manufacturing industry is ship-building, which is carried on at various places.

Commerce and Transportation.—Much of the trade carried on is merely coasting, but the foreign trade also is of considerable extent. A large part of the foreign shipping of Greece is that which deals with the import of the manufactures of England, Germany, etc., into Greece, Turkey, and the Levant generally. In regard to this branch, the peculiar advantages which the Greeks possess in their knowledge of the languages, and acquaintance with the habits and wants, of the people of these countries, have been greatly in their favor. It is as agents and carriers specially that the Greek ship-owners are engaged: they are in fact the great commission agents and carriers of the Mediterranean. Greek merchants have now established themselves in the larger cities of the world; and as they have greater facilities for collecting articles of commerce from the inland parts of their own and contiguous countries, they now control almost the entire traffic of the Ottoman empire, of Persia, and of other eastern countries.

Every circumstance tends to make the Greek a man of commerce. He is of a quick, active, versatile, and practical turn of mind, and possesses all those qualities which insure success in business. The bays and gulfs of the sea-indented shore allure him to the waters, while the strong currents and frequent squalls on his iron-bound coast soon render him an expert and fearless seaman. The islanders are thrown into a seafaring life even more than the people of the mainland. Greece occupies a position in the Mediterranean which, for commercial advantages, cannot be surpassed.

The chief ports of Greece are Piræus (population 42,-169, the port of Athens), Syra, and Patras (population

37,958). The principal export is currants (very largely to Britain); but wine, olive-oil, dried figs, raisins, silver, lead, zinc ore, and manganese iron ore, tobacco, sponges, and other articles are also exported; the principal imports are cereals, coals, and cotton and woolen goods. The imports in 1891 were $27,800,260, the exports $21,497,040; in 1904 the imports were $26,441,000, and the exports $17,480,000. The greatest hindrance to the development of Greece is the want of good roads, which are peculiarly necessary in so mountainous a country. Attention, however, has been directed to the supplying of this want, and there are now over 2,043 miles of roads. Among other public works which have engaged the energies of the Greeks are the construction and restoration of harbors, the erection of lighthouses, the execution of drainage works, etc. In 1883 there were only 58 miles of railways open, but in 1905 695 miles were open, and 300 were under construction. A ship canal across the isthmus of Corinth (4 miles) was opened in 1893.

Weights, Measures, and Money.—The French metric system of weights and measures has been introduced into Greece by the government, but the people still adhere to the old system. In the latter the standard lineal measure was the *pikē*, equal to three quarters of an English yard; the standard square measure was the *stremma*, nearly equal to .242 of an English acre; the standard weight was the *oke*=2.80 pounds avoirdupois: 44 *okes* were equal to 1 *cantar*, or about 124 pounds avoirdupois. The weights and measures of the metric system are called royal, to distinguish them from the old weights and measures. In this system the French measures of length, millimetre, centimetre, decimetre, and metre are called respectively *gramma*, *daktylos*, *palamē*, and *pēcheus* (cubit). The kilometre is called a *stadion*, and the myriametre *skoinis*. The new or royal measures of surface are the square *pecheus*=the square metre, and the *stremma*=the are. The measures of capacity are the *kybos*, *mystron kotylē*, *litra*, and *koilon*, respectively equal to the millilitre, centilitre, decilitre, litre, and hectolitre. The weights for gold, silver, and precious stones are the *kokkos*, *obolos*, and *drachmē*, respectively equal to the centigramme, decigramme, and gramme. The commercial unit of weight is the *mna*=1,500 *drachmēs*=1½ kilogramme. The *talanton* is equal to the quintal, and the *tonos* equal to the tonneau.

In 1875 Greece entered the monetary league of which the other members are France, Italy, Switzerland, and Belgium, and all the members of which have a monetary unit equal to the franc in value. The name of the Greek unit is the *drachma*, divided into 100 *lepta*, nominally equal to a franc but varying considerably in value.

Government.—In ancient Greece, each state managed its own affairs, and governments were of different kinds.

GREECE.

In Homeric times, monarchy seems to have prevailed; but in later years, republics, aristocracies, and oligarchies almost entirely usurped the ruling power; factions were rife, and in many cases their contests led to a total disruption of the body-politic. The present constitution of Greece was arranged by an assembly elected 1863, Dec., and was adopted 1864, Oct. 29. As settled by the constitution the throne is hereditary according to the law of primogeniture in the family of King George. The king must be a member of the Greek Orthodox Church. He attains his majority at the age of 18. The whole legislative power is vested in the Boulé, or House of Representatives, the members of which are elected by manhood suffrage for four years. The elections take place by ballot, and the chamber must meet annually for not less than three nor more than six months. There must be an attendance of at least one half the members to give legality to the proceedings; and no bill can become law without the consent of an absolute majority of members. The assembly has no power to alter the constitution itself. The Chamber of Deputies meets on ordinary occasions, on Nov. 1 (O.S.) of every year. The executive is vested in the king and the ministers at the head of the following departments, who are responsible for the acts of the sovereign: Ministry of the Interior, Finance, Justice, Education and Ecclesiastical Affairs, War, Marine, and Foreign Affairs. There is also a deliberative council of state, whose members, not less than 15 nor more than 25, are named by the crown, and hold office two years. To this council must be sent all bills from the Chamber of Deputies, and they are to be returned with observations or amendments within ten days; but this term may be prolonged for 15 days more. If no report is then made, the deputies may pass the law and send it up to the king. The education of the people is undertaken at the public cost; offices of state and positions of distinction are open to all.

Administration of Justice.—The supreme court of justice is called, as in Athens of old, the Areopagus. Besides this there are five higher courts, one at Athens, one at Nauplia, one at Patras, one at Larissa, and one at Corfu; and a number of courts of primary resort (*Protodokeia*), in the principal towns.

Army and Navy.—In 1867, military service was made obligatory on all Greek subjects over 21 years of age; but it was only in 1880 that this system was fairly introduced, the providing of substitutes and other evasions having been strictly prohibited. The total term of service is 30 years—2 years in the regular army, and 10 years in its reserve; 8 years in the militia (landwehr), and 10 years in its reserve. The nominal strength of the army in 1907 was: infantry 16,400; cavalry 4,250; artillery 6,782; engineers, etc., 2,800; total peace strength 30,232; 1st reserve 31,340; 2d re-

serve 62,500; total war strength about 125,000. The navy consisted of 4 battleships, 2d and 3d class; 6 cruisers; 12 sea-going gunboats; 2 torpedo boat destroyers; 44 torpedo boats; 15 transport, hospital and supply ships; 585 officers and 6,870 men.

Finances and Banking.—The public revenue, derived chiefly from direct taxes, customs, stamps, excise, monopolies, the rent of national property, etc., was estimated for 1906 at $19,743,277, and the expenditure at $19,540,468. Greece has a very large public debt. In 1906 the amount of this debt was $167,052,145. A considerable portion of the debt incurred in recent years has been in the way of raising loans for the making of railways. Of the foreign debt one loan is guaranteed by Great Britain, France, and Russia, which have latterly had to pay the dividends on it, and which are now accordingly heavy claimants on Greece. The payment of the interest on its public debt has long been with Greece a matter of difficulty. The chief banking institutions of their kind are the Ionian Bank, established in 1839 with headqoarters in London, and the National Bank, dating from 1841 and with which the Epiro-Thessalian Bank was incorporated in 1900. There are also numerous private banks and an agricultural bank at Patras.

Inhabitants (Ancient Greece).—Of the earliest inhabitants of ancient Greece we have no definite knowledge. The term *autochthones* (sprung from the soil itself—earth-born), which the Greeks applied to themselves, means no more than this, that the people had been there from time immemorial, and that their descendants had not the means or the inclination to trace their origin any further back. At a very early period the population of Greece was largely, if not entirely, composed of Pelasgians (q.v.). It is probable that the Hellenes were only a branch of this great Pelasgian stock, but possessing more energy of character, they gradually spread themselves over the greater part of Greece, and supplanted the language and institutions of the Pelasgi by their own: thus they became the ruling race, and gave their name to the country.—*Modern Greece.*—The population of modern Greece is greatly mixed. In Ætolia, Acarnania, Thessaly, the greater part of Peloponnesus, and most of the islands, the descendants of the old Greeks are still predominant; but a very large admixture of Albanians (see ALBANIA) prevails in Attica, Bœotia, Phocis, and Argolis, with the islands of Spezzia, Salanis, Hydra, and Andro. The true Greek is easily recognized by his tall stature, slim body, aquiline nose, oval face and mustache. Whiskers are not considered staid and respectable; the beard is worn only in mourning. The Greeks are uncommonly temperate both in eating and drinking, and in the indulgence of the passions generally; flesh is seldom eaten; the diet is principally vegetable. The Greeks are devotedly attached to their

fatherland, and their love of liberty and independence is not less strong than in the days of Miltiades and Themistocles. Aristocracy is, in consequence, at a discount; and though they love and are loyal to their good ruler, yet they are easily roused into resistance by the infringements of their rights. Commercial bargains are the delight of the Greeks, and they often manage, it is said, to part with their wares at twice their value. This sharpness they practice against the Turks especially. The Greek women are not beautiful. Early marriages are common. Greek matrons take great pride, like Niobe of old, in a numerous and beautiful offspring. But many of the children are cut off in infancy by the fevers which prevail. Two peculiar branches of the Greek race are—the Mainotes (from a district called *Maina*) of the Peloponnesus, and the Palikars of the n. highlands. The former, who boast to be the descendants of the ancient Spartans, inhabit principally the mountain fastnesses of Taygetus, where for centuries they defied the power of the Turks. They resemble in their sturdy independence, feudal relations, robbing propensities, and other characteristics, the Highlanders of Scotland 150 years ago; but in recent times, education, intermixture with other races, and commerce have, to a great extent, removed their peculiarities. The Palikars, that is, *Braves*, originally belonged to the n. parts of Greece; but when Thessaly and other portions were by treaty left in the hands of the Turks, these hardy mountaineers chose to leave their ancient homes and settle in the new kingdom, to establish which they had shed their blood. The red cap, the white shirt, and the golden jacket, mark them out even to the casual observer as a separate class. They go about armed, and attended by armed followers; their houses are fortresses and their servants form a little army. The islanders are almost all seamen or traders; they wear the red cap, a short jacket, and wide turkish trousers. The Albanians form about a fourth of the population; they are a strong, hardy race, and engage in agricultural or other severe labor. They are the hewers of wood and drawers of water to the more wealthy. They speak a language little allied to Slavonic or Greek. The Wallachs are a nomad and pastoral race; they sleep on the hillsides with their flocks, which are guarded by ferocious dogs. There are large numbers of Maltese at Athens, and the Piræus especially. There are few settlers from west Europe. The Bavarians who swarmed into Greece on the accession of King Otho have almost all disappeared.

Religion.—The Greek Orthodox Church alone is established, but all other forms of religion enjoy toleration. The highest ecclesiastical authority, subject to the king, is vested in a permanent synod, which sits at Athens, and consists of five members appointed by the king from the highest dignitaries of the church. There is one metropolitan, who has his seat at Athens, 21 arch-

THE ACADEMY, ATHENS, GREECE.

bishops, and 29 bishops, who are presented and ordained by the synod, and confirmed and invested by the king. See GREEK RELIGION (Ancient); GREEK CHURCH.

Education (*Ancient*).— The education of the ancient Greeks was more physical than mental. The *gymnasium* was that of the athlete, not that of the *didaskalos* or preceptor. Young children were, till about their sixth year, trained at home by women, but were then sent to the *didaskaleia*, or schools under the charge of private tutors or pædagogi. The duty of the pædagogus was rather to keep his wards from outward injury and bad companions, than to teach them the accomplishments of grammar (including reading, writing, and arithmetic), music, and gymnastics, the favorite subjects of study in those days. In later times, the more intelligent slaves were specially trained for the duties of the pædagogus.—*Modern*.—The educational system of Greece, organized in 1834 by George Gennadius, one of the leaders of the war of independence, is very complete. There are three grades of schools, the demotic or primary national schools, the Hellenic or secondary grammar schools, and the gymnasia, in which, it is asserted, the range and the level of the teaching are much the same as in a German gymnasium or in the upper parts of our public schools. In all three grades of schools education is gratuitous, and in the primary schools it is compulsory on all children between 5 and 12. There is a university at Athens, attended by nearly 3,000 students, many of whom come from districts under the rule of the Sultan. Thus far, however, education seems to be actually diffused among the people only to a limited extent, though the numbers that receive a university education are so great that many such young men find themselves without any proper sphere of employment, and are obliged to adopt the career of politician and place-hunter. Many of these are now, however, said to be finding better ways of turning their education to account through the rapid development of trade and industry.

Language (*Ancient*).—The Greek language is a branch of that wide-spread family of tongues, usually called Indo-Germanic or Aryan. It prevailed not only in the different parts of Greece, but also in the numerous Greek colonies which fringed the shores of the Euxine and the Mediterranean. But it must not be supposed that it was of the same type at all periods of Greek history, or in all parts of Greece, even at the same time. The three great branches of the Greek tongue were: 1. The Æolic, the oldest form, and that which presents the greatest affinity to the Latin and other members of the Indo-Germanic stock. 2. The Doric, a highland dialect, delighting in broad and rough sounds; it was spoken in the mountains of Thessaly, whence it travelled southward, and on the migration of the Dorians, took possession of the Peloponnesus. 3. The Ionic, a soft

and vocal language, delighting in vowel sounds, and avoiding the harsh combination of consonants; it was spoken principally by the people of Attica and the Ionian colonies in Asia Minor. From it was made, by a series of contractions and modifications, that most perfect form of the Greek language, the *Attic*, which was neither so harsh and broad as the Doric, nor so soft and vocal as the Ionic. It was brought to the height of perfection by the poets, the philosophers, and the historians of Greece, whose writings still teach the world, and command its admiration.

When the Greeks became acquainted with the art of writing we do not know. In Egypt hieroglyphics were used more than 3,000 years before the Christian era, and the cuneiform writing of Assyria and Babylonia had a similar antiquity. In Crete writing was practised more than 2,000 years before Christ it is believed, and among the Asiatic Greeks it was probably introduced 9 or 10 centuries before Christ. According to the writer Prof. Bury: 'Perhaps the earliest example of a Greek writing that we possess is on an Attic jar of the 7th century; it says the jar shall be the prize of the dancer who dances more gaily than all the others. But the lack of early inscriptions is what we should expect. The new art was used for ordinary and literary purposes long before it was employed for official records. It was the great gift, which the Semites, who themselves derived it from Egypt, gave to Europe.' According to the legend it was Cadmus the Phœnician who introduced the alphabet into Greece; and it is an undoubted fact that the most of the Greek letters are derived from the Phœnician ones. The Greek alphabet possesses the following 24 letters: A, α (alpha), a; B, β (beta), b; Γ,γ (gamma), g; Δ, δ (delta), d; E, ε (epsilon), ĕ; Z, ζ (zeta), z; H, η (eta), ē; Θ, θ (theta), th; I, ι (iota), i; K, κ (kappa), k; Λ, λ (lambda), l; M, μ (mu), m; N, ν (nu), n.; Ξ, ξ (xi), x; O, ο (omicorn, i. e. small o), ŏ; Π, π (pi), p; P, ρ (rho), r; Σ, σ, ς (sigma), s; T, τ (tau), t; Υ, υ (upsilon), u, commonly transliterated by y; Φ, φ (phi), ph; X, χ (chi), ch guttural; Ψ, ψ (psi), ps; Ω, ω (omega, or great o), ō. There are also marks indicating accent, a rough and a smooth 'breathing,' the former equivalent to *h* initial before a vowel; but no *j*, *v*, *w*, etc. The alphabet originally introduced into Greece is said to have consisted of but 16 letters; 4 (Θ Ξ Φ X) are said to have been invented by Palamedes during the Trojan war, and 4 more (Z H Ω Ψ) by Simonides of Ceos. That the 8 letters mentioned are more modern than the others is certain, partly from historical accounts, partly from the most ancient inscriptions. It remains to remark that the Greeks originally wrote from right to left; then *boustrophedon*, that is, alternately from right to left and left to right; and finally always from left to right.

By the conquests of Alexander the Great, the Greek

language soon spread over a large part of the then known world, but corruption at once set in—words of other languages were adopted into the Greek, foreign idioms were introduced, and the rigid syntax of the great Athenian writers was neglected, so that, in process of time, there arose a depraved form of speech, called the Hellenistic, varying in many essential points from its great parent. In this last form the books of the New Testament were written. The process of deterioration still went on till about the middle of the 18th c.; when at length the spirit of the Greek nation again arose, and amid other endeavors to revive the ancient glory of their race, an attempt was made, and is still being made, and with great success, to restore the purity of the language.

Language of Modern Greeee.—In different parts of Greece different languages are spoken according to the element which predominates in the population. Thus Turkish prevails in some districts, Albanian in others, Wallachian in others, and Bulgarian in others; but in the greater part of Greece proper, the language is *Romaic Greek*, or as it is now more usually and more properly called, Neo-Hellenic. This language bears a very close resemblance to the Hellenic, or Classical Greek; and in fact does not differ more, if so much, from the Attic, as the Attic differed from the Doric. Information on this subject must be sought in a grammar of the language. Great efforts have been made in recent years to purge the Neo-Hellenic of barbarisms and foreign terms, and it is now written with such purity, that good scholars in ancient Greek have little difficulty in understanding Tricoupis's history or an Athenian newspaper.

Literature (Ancient).—The literature of Greece offers a field of vast extent, for adequate view of which recourse must be had to a full treatise. Poetry seems to have been the earliest form of composition among the Greeks, as indeed it must of necessity be in all nations, for facility of recollection; hence *Memory* is called the *Mother of the Muses.* The earliest poems seem to have been hymns in honor of the gods; to these succeeded songs praising the glorious deeds of heroes; but the greatest poem of ancient times which has come down to us is the *Iliad* of Homer, detailing the events connected with the siege of Troy, and the warriors who took part in that famous expedition. The *Iliad* and *Odyssey* have been for many centuries known and admired by scholars throughout the western world. The remarkable popularity of the Homeric poems produced a host of imitators; and many poets endeavored to rival the fame of the 'blind old man,' by narrating in verse the after-fate and vicissitudes of the heroes who took part in the war of Troy, or by treating of subjects allied to that of the *Iliad*, and even of mythological fables. These were called the Cyclic poets; they were subsequent to Homer

and Hesiod: their writings were put together in chronological order by some Alexandrine grammarians about B.C. 200. The Homeric period is closed by the name of Hesiod. Homer is supposed to have written about B.C. 900, and Hesiod about B.C. 850. Hesiod's most celebrated writings are the *Theogony*, the *Shield of Hercules*, and the *Works and Days*, an agricultural poem. Of his others, only small fragments are preserved. Epic poetry culminated in Homer, and with him and his contemporaries it subsides. Of lyric poetry, there were two schools —the Æolic in Asia Minor and adjacent islands, especially Lesbos, and the Doric in Peloponnesus and Sicily. Of the Æolic school, the earliest poet was Callinus (B.C. 700); after him came Archilochus, famed for his cutting satires in iambic verse: Tyrtæus, and Simonides of Amorgos, who contests with Archilochus the honor of having invented iambic verse. Alcæus and Sappho (about B.C. 610) represent the Æolic school in its perfection. To Anacreon (about B.C. 520) have been attributed many pieces not considered genuine. Of the Doric or choral school, it may suffice to mention Alcman, Stesichorus, Arion, Simonides, Bacchylides, and greatest of all in every known variety of choral poetry, Pindar (q.v.) the Theban (B.C. 522).

Greek literature reached its highest perfection in the tragedies of Æschylus (B.C. 525–456); Sophocles (B.C. 495–405); and Euripides (B.C. 480–406). The writers who endeavored to follow in the track of these three great masters were far inferior, and with them tragedy degenerated to the effeminacy of lyrical songs and rhetorical bombast.

Comedy, like tragedy, took its origin from the worship of Bacchus. The three great names of the old Attic comedy are Cratinus, Eupolis, and Aristophanes (B.C. 452–380). In middle comedy, we have the names of Antiphanes and Alexis; and in new comedy, Philemon and Menander.

History did not engage the attention of the Greeks till a comparatively late period. Mentioning only the names of Cadmus of Miletus, Pherecydes of Scyros, Hecatæus, and Charon of Lampsacus, we come to Herodotus, the Father of History—or, as he has been called, the Homer of History—who wrote about B.C. 440; Thucydides, about B.C. 430; and Xenophon, about B.C. 400. In later times, were Polybius (B.C. 204–122); Dionysius of Halicarnassus, about B.C. 20; Diodorus Siculus, contemporary of Julius and Augustus Cæsar; Plutarch; Appian (in time of Hadrian and Antoninus Pius); Arrian (time of Hadrian); and Dion Cassius. In geography, were Strabo and Pausanias. In satire, the palm is borne by Lucian (q.v.). In oratory, were Antiphon (b. B.C. 480), Andocides (B.C. 467), Lysias (B.C. 458), Isocrates (B.C. 436), Æschines, great rival of Demosthenes (B.C. 389), Hyperides; and last and greatest of all, Demosthenes (B.C. 385). Among Greek philosophers were Thales of Miletus

(B.C. 636), Anaximenes (B.C. 529), Diogenes of Appolonia (B.C. 460), Anaximander of Miletus (B.C. 610), Pythagoras, Xenophanes (B.C. 620), Parmenides (B.C. 536), Zeno (B.C. 500), Heraclitus (B.C. 503), Anaxagoras, Empedocles (B.C. 444), Democritus of Abdera (B.C. 460), Protagoras, Socrates (B.C. 469), Aristippus of Cyrene, Antisthenes, Diogenes of Sinope, Plato, Aristotle (B.C. 384), Pyrrho, Pericles, Euripides, Epicurus of Samos (B.C. 342), Hypatia, and Carneades (B.C. 213). See also PHILOSOPHY, HISTORY OF; ASCETICISM; CYNIC; CYRENAICS; ELEATICS; EPICUREANISM; MONOTHEISM; PANTHEISM; PLATONISTS; SKEPTICS; SOPHISTS.

Literature (*Modern*).—The literature of modern Greece is still in its infancy. No work of importance appeared previous to the revolution; but since the establishment of the kingdom 1829, more life has been infused into the men of a literary bent. The names of the brothers Panagiotis and Alexander Soutsos are known to scholars in w. Europe and America. They have written dramas, love-songs, novels, lyrics, and a poem (by Alexander) in the style of Byron's *Childe Harold*, detailing the wanderings, sights, and adventures of a Greek in France and Italy. In most of these there is much merit, though few readers can fully appreciate the style and handling. Among dramatic writers, Neroulos, Rangavis, and Charnouzis hold foremost place. *Memoirs of Different Battles fought between the Greeks and Turks from* 1820 *to* 1829, by Perrævos, is a well written book. In grammar and lexicography, Bamvas, Gennadios, Scarlatto Byzantino, and others, have done good service to the cause of learning. But of all the Neo-Hellenic works yet published, the *History of the Greek Revolution* by Tricoupis is the most valuable—not only for statement and facts, but also for purity and elegance of style. Many newspapers and other periodicals, in Neo-Hellenic, are published at Athens, Constantinople, London, and elsewhere; but the expense of these literary efforts is in most cases borne by wealthy Greek merchants, now frequently met with in w. Europe. Many years of good government, of national industry and prosperity, will be requisite before Greece can assume that position in the world of letters which the prestige of her name entitles her to anticipate.

History (*Ancient*).—The early history of Greece is lost in the mist of ages. The legends of gods and heroes, which constitute her only approach to history, are of that marvellous kind in which a superstitious and ignorant age delights. But how much truth may underlie the stories of Cecrops, Cadmus, Danaus, Theseus, Heracles, and many others, it is difficult to say; or to what extent the events of the Argonautic expedition, Trojan war, hunt of the Calydonian boar, and other joint-stock exploits, may be real, historians do not hope to discover. The heroic age is roughly estimated as B.C.

1400–1200, but all Greek chronology is mere guess until the first Olympiad, B.C. 776.

This period, however, has, to some degree, been illuminated by the excavations and studies of the late Dr. Schliemann, and more recently by the labors of the eminent German archæologist, Dr. Wm. Dörpfeld. These investigations in Mycenæ and other parts of Greece, prove that a magnificent pre-Homeric civilization existed, as early probably as 1500 B.C. The splendid workmanship of certain golden ornaments found in Mycenæan tombs are among the most interesting of the discoveries.

There were migrations during these early days, and numerous colonies were planted by the Greeks; there were wars of the Spartans against the Messenians, which beginning B.C. 743, did not end until Ithome was destroyed in the third Messenian war, B.C. 455. Meantime, wars of less magnitude are carried on in different parts of Greece; Solon legislates at Athens (B.C. 594); Pisistratus and his sons hold the 'tyrannis' at Athens (B.C. 560–510), Crœsus, King of Lydia, and Cyrus the Great, his conqueror, are brought into contact with the Asiatic Greeks (B.C. 560–542). And now B.C. 499, the burning of Sardis by the Athenians and Ionians leads to those three memorable invasions of Greece by the Persians which end so gloriously for Greece, and so disastrously for Persia. The first invasion under Mardonius, B.C. 492, is averted by the shipwreck of the invading fleet off Mount Athos; the second, under Datis and Artaphernes, B.C. 490 is hurled back from Marathon; and the third, under Xerxes, B.C. 480, is utterly shattered at Thermopylæ, Salamis, and Platæa. Greece is now a mighty name, but the Athenians become the ruling state, and their supremacy continues till B.C. 404. Meantime, disunion at home succeeds the contests with foreign enemies. The great Peloponnesian war begins B.C. 431, and wastes the energies of Greece for 27 years, until the subjugation and partial demolition of Athens, B.C. 404, ended for a time the fratricidal struggle. It was in B.C. 415, the 17th year of this war, that the famous and unfortunate expedition to Sicily took place. Under Pericles, the ruling spirit of Athens at the commencement of the war but who died of the great plague B.C. 429, the Athenians reached the highest point of excellence in sculpture and architecture; then were raised some of those wondrous buildings whose remains still excite the admiration of posterity at a distance of more than 2,000 years. B.C. 401 the expedition of Cyrus the Younger to dethrone his brother Artaxerxes, took place; the battle of Cunaxa, in which Cyrus was slain, was in the same year. Cyrus had employed Greek mercenaries, and this brief war is specially famed for the masterly retreat of the 10,000 Greeks under Xenophon the Athenian, B.C. 401–400. The next year (B.C. 399), Socrates the philosopher,

teacher of Plato and Xenophon, was put to death. After the defeat of the Athenians in the Peloponnesian war, the Spartan state became the leading power in Greece, and was engaged in four wars in succession—1st, the Elean (B.C. 399–398); 2d, the Corinthian (B.C. 395–387); 3d, the Olynthian (B.C. 380–379); 4th, the Theban (B.C. 378–362). The great Spartan hero of these troublous times was Agesilaus, whose panegyric was written by Xenophon with a friendly pen. During these eventful years were fought the battles of Coronea and of Corinth (B.C. 394), Orchomenus (B.C. 375), Leuctra (B.C. 371), Mantinea, in which the Theban hero, Epaminondas, was slain (B.C. 362). B.C. 369 Philip ascends the throne of Macedonia and a few years afterward finds occasion to intermeddle in the affairs of Greece. Some of the allies of Athens renounce his supremacy, and thus arises the Social war (B.C. 357–355), in which Athens loses many of her tributaries, and much of her revenue. The Sacred war (B.C. 355–346) immediately follows, in which Philip takes part. About this time (B.C. 352), Demosthenes delivered the first of those powerful orations against Philip, called Philippics. In the battle of Chæroneia (B.C. 338), the Athenians and Thebans are utterly defeated by Philip; and at the congress of Corinth, in the following year, he is appointed generalissimo of the Greek forces against Persia. But the hand of the assassin cut him off at a marriage-feast in Macedonia; and after an unsuccessful revolt against his son Alexander, the Greeks are compelled to bestow upon the youthful hero the same high military office with which they had intrusted his father. The events of Alexander's career are well known. From this time Greece becomes an appanage of the Macedonian kingdom, until Macedon is in turn overcome by the Romans. During the wars which arose among the successors of Alexander Greece was always the bone of contention; she suffered in consequence many hardships, and had few intervals of peace. The last struggle for Grecian liberty was made by the Achæan League (a confederacy of cities at one time embracing all Peloponnesus, which had a common object, a common council, and a common chief or *strategus*—see ACHAIA), but it too fell before the conquering arms of Rome; and after the capture of Corinth B.C. 146 by the consul Mummius, the once mighty Greece became a province of the Roman empire.

History—(Modern).—The history of Greece for some centuries after the capture of Corinth belongs to the history of her conqueror. The Roman wars with Antiochus Mithridates, and others, involved Greece in countless hardships; and the fierce struggles of Cæsar and Pompey, of Brutus and Cassius with Antony and Octavianus, of Antony and Octavianus, of which Greece was often the theatre, entailed on her many calamities. For nearly two centuries after the accession of Augustus,

Greece had comparative tranquillity, during which Christianity spread among her people, churches were founded, and many devoted Greeks went abroad to strange lands and imperilled their lives in the propagation of the Gospel of Christ. But dark days again awaited her, and successive inroads of Slavonians, Albanians, and other barbarous hordes, overran the country from the wintry plains of the north. When Constantine divided his empire, Greece was attached to the eastern portion; but when, 1204, the Venetian fleet under Dandolo overpowered the rickety throne of the Cæsars, Greece too changed masters. The Osman Turks, who migrated to Europe, 1355, and made themselves masters of Thrace, Macedonia, Thessaly, and other parts, captured Constantinople 1453; and from that time until recent years Greece was subject to Mohammedan dominion. All the annoyances that ignorance, brutality, tyranny, and greed could suggest, were practiced by the Turks on the much enduring Greeks; but at length human nature could no longer endure, and in 1820 broke out that rebellion against Turkish rule, which, by the bravery and determination of the Greeks, and the friendly countenance of Christian Europe, ended in the establishment of Greece as an independent kingdom 1829. Two unsuccessful attempts at rebellion had been made, 1770, and 90; Capo d'Istrias, first president of liberated Greece, was assassinated 1831; and after several candidates for the throne of the infant kingdom had been proposed and rejected, Otho, second son of the king of Bavaria, was at length (1832) chosen by the three powers (Britain, France, Russia) which had assisted Greece in her noble struggle. The reign of Otho was not peaceful, and he had serious difficulties to contend with after he had assumed the reins of government 1835. But his rule was not altogether devoid of fruit; and law and order, industry and commerce, literature and notions of self-government, advanced. On the banishment of Otho 1862, the crown was offered to Prince Alfred of England. The agreement between the protecting powers, however, stood in the way of his election, and the present king, Georgias (George) I., son of Christian IX. of Denmark, became king 1863. The Berlin Congress 1878 recommended the addition to Greece of the s. portions of Thessaly and Albania; this enlargement of territory was accomplished, with some modifications, 1881, after Turkey had refused to cede the entire area specified. War seemed at first likely to result from the disagreement; but ultimately was averted, through the efforts of the European powers, by the compromise to which the Greeks reluctantly assented.

In 1896, Apr., there broke out in Crete a revolt of the so-called 'Christian,' i.e., non-Mohammedan, population against Turkish rule. There were fierce battles, and numerous outrages were committed on both sides.

Concessions offered by the Porte (Aug.) temporarily pacified the island; but as the Porte failed to carry these reforms into effect, the Cretans again rose in arms early in 1897. Greece promptly espoused their cause, and Prince George with a force of Greek troops landed on the island Feb. 12. Fearing that successful intervention by Greece in Crete might precipitate a general European war, or what was dreaded even more, a war of the united Mohammedan races of the Orient against the Christian nations, the great powers, in the interests of peace, took possession, Feb. 15, of Canea, and later of Retimo, Heraclion, and a few other points in Crete. On Mar. 21 a 'pacific blockade' of the island was begun by war-ships of the Russian, British, French, German, and Italian fleets, to prevent either Greeks or Turks from landing troops or war material. Cretans attacking Turkish troops near these points were repeatedly shelled by the allied fleets.

In Greece an enthusiastic eagerness was developed for war with Turkey with the hope of not only annexing Crete, but of recovering Macedonia. To this sentiment the king and his government reluctantly yielded, and early in March the Greek reserves were called out, estimated at about 80,000 men, but lacking much in drill and equipment. The Turks hurried troops to Salonika, till by the end of March they had assembled on the Greek frontier 150,000 men, well armed and equipped, largely drilled, and in part commanded by German officers, the whole force being under command of the veteran general Edhem Pasha. Their artillery and rifles were greatly superior, not only in number, but also in effectiveness, to those of the Greeks. The great powers notified both nations that they would unite to prevent whichever country should be the aggressor from gaining any permanent increase of territory as the result of the war. Greece refrained from any official overt act, but on Apr. 9 a force of 1500 or more so-called 'Greek irregulars'—brigands, organized and equipped by a Greek revolutionary society, the *Ethnike Hetairia* or National League—crossed the frontier of Macedonia, and soon came into collision with the Turkish outposts. The Turkish council of ministers decided Apr. 17 that in view of these incursions a state of war with Greece already existed, and on that evening Turkish troops attacked the Greek force at Nezeros, Turkey thus being technically the aggressor. Apr. 17–19, after a fierce struggle, the Turks secured possession of Milouna pass in the Olympian range, near Tyrnavo, the gateway to the great Thessalian plain. The main Greek army was encamped 11 miles s. of Tyrnavo at Larissa, a considerable town commanding the plain. Apr. 23 an important pitched battle was fought at Mati, near the mouth of Milouna pass, which caused Crown Prince Constantine to order the immediate evacuation of Tyrnavo. The retreat took place at

night, the frightened population encumbering the roads in the darkness with fugitives and household goods, till the retreat beeame a rout in panic and wild disorder. The next day (Apr. 24) the whole army retreated from Larissa to Volo and Pharsalos. Almost the entire population of the eity (about 14,000) aeeompanied the retreat, destroying all semblanee of military diseipline, so that immense quantities of war material and supplies, including a large number of eannon, were abandoned to the enemy. On the 25th the Turkish forces oceupied Larissa. Meanwhile in the west the Greek squadron in the Gulf of Arta had bombarded Prevesa, and the Greek army in Epirus, under eommand of Col. Manos, had aehieved important suecesses, and was advancing on the eity of Janina. But three days after the evaeuation of Larissa this advance was suspended and the Turkish troops immediately assumed the offensive. After the retreat from Larissa the Greek eause was at onee seen to be hopeless and the way to Athens praetieally open to the invaders. Excitement in Athens beeame intense. The Delyannis ministry was foreed from power, and a new cabinet was formed (Apr. 30) headed by Demetrius Ralli. The Turks made (Apr. 30–May 2) several ineffeetual attacks on Velestino, where the fighting was very severe. On May 5 the Greeks were driven from several positions near Pharsalos, and on the evening of the same day that eity and Volo were abandoned, and the Greek army concentrated at Domoko. About the same time the Greek forees in Epirus were driven back across the border. The Greek fleet, composed of efficient modern war-vessels, to which the Turks had praetically nothing to oppose, took no part in the conflict on the east exeept as inaetive speetators at Volo.

On May 11 the powers presented to the Greek govt. a joint offer of mediation whieh was aeeepted. On May 13 the powers sent to the Porte a eollective memorandum seeking an armistiee. Hostilities, however, still eontinued, and on the 17th the Turks after severe fighting eaptured Domoko. On the 18th a preliminary armistiee was eoneluded. The Turks proeeeded to harvest the erops in Thessaly, and to establish there local Turkish governors and laws. May 20 the Greek troops were withdrawn from Crete. On June 3 the ambassadors of Turkey and of the great powers met as peaee negotiators at Constantinople. The terms at first proposed by Turkey were the eession of Thessaly, the payment of the war indemnity of $20,000,000, and the revoeation of the speeial privileges enjoyed by Greeks resident in the Turkish dominions. The powers promptly deeided against any dismemberment of Greeee or the requirement of a erushing indemnity. In July terms were settled of autonomy for Crete under a Christian governor aeceptable to the Sultan as suzerain, with a legislature composed of Christians and Mussul-

mans according to their numerical strength, a tribute of $50,000 annually to be paid to Turkey, to begin five years after the autonomy is established, the Greek to be the official language, and Crete to have a flag of her own. M. Numa Droz, ex-president of the Swiss executive, was appointed governor.

The commission decided that Thessaly should be restored to Greece, Turkey to be granted a certain extension of her frontier involving military advantages, and to evacuate the rest of the province within 30 days after the conclusion of the treaty of peace; the war indemnity to be reduced to a moderate sum.

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GREED, n. *grēd.* See under GREEDY.

GREEDY, a. *grē'dĭ* [AS. *grædig;* Dan. *graadig*, greedy: Goth. *grêdags*, crying for food, hungry: Skr. *gridhnu*, greedy—from *gridh*, to be greedy]: ravenous; voracious; having a keen appetite for food or drink, or for anything desired; vehemently desirous. GREE'DILY, ad. *-lĭ*, in a greedy manner; eagerly; ravenously. GREE'DINESS, n. keenness of appetite for food or drink; voracity; ardent and selfish desire. GREED, n. *grēd*, greediness; avarice.—SYN. of 'greediness': eagerness; avidity; ravenousness; avarice.

GREEK, n. *grēk:* a native of Greece; the language; in *familiar language*, something unintelligible: ADJ. pertaining to Greece. GREEK'LING, n. a beginner in Greek. GREEK CALENDS, never; to defer a thing to the *Greek calends* is to defer it indefinitely or *sĭnĕ dĭē*, as there were no calends in the Greek months.

GREEK ART AND ARCHITECTURE: the history of Greek Art and Architecture reaches back to a time preceding by several centuries the beginning of authentic Greek history. There is abundant evidence, both literary and archaeological, of the existence in the Hellenic peninsula of a highly civilized race of men who reached the climax of their power about 1500 B. C. These people may have been of Hellenic stock, though Herodotus draws a definite distinction between them and the Hellenes proper. They are known as the Pelasgians and the age in which they lived is called the Mycenæan Age. They disappeared before the invasion of the Dorians about 1000 B. C., but left to their ruder and more uncivilized conquerors many valuable artistic and architectural remains. Any history of Greek art or architecture must, therefore, begin with the study of the art and architecture of the Mycenæan Age.

The discoveries of recent years have brought to light many relics of this primitive age especially at Tiryns, Argos and Mycenæ, ancient cities of Argolis. Among these are walls of enormous thickness surrounding the palaces of powerful chiefs, constructed of huge masses of unhewn stones with smaller stones to fill up the gaps, and others more carefully built of colossal blocks of polygonal form fitted together without mortar. These walls the Greeks of later time called Cyclopean Walls because they seemed the work of giants. Their general characteristics were imitated by later builders. The gates let into these walls were closed at the top by the projection of successive courses of stone or by a huge straight block, stretching from one side post to the other. The most famous of these gates

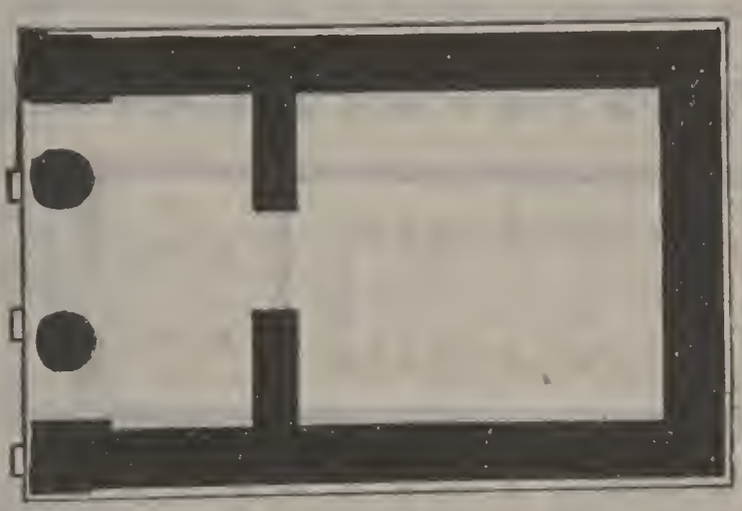
The Parthenon from the East.

is the Lions Gate at Mycenæ. The lions above this gate are the earliest existing remains of sculpture in Greece

Belonging to this same primitive age are the circular chambers, usually subterranean, built of horizontal courses of stone approaching from all sides until they meet. They are called treasure houses, but were probably places of burial. The best preserved are at Mycenæ.

The prehistoric palaces at Mycenæ and Tiryns are shown by existing remains to have been of an advanced order of building. There were many rooms, courtyards and banqueting halls and the roof was supported by columns. Modern discoveries have shown that Homer's description of the Heroic Age is essentially correct.

Not only from the Mycenæan Age did the Greeks borrow architectural ideas, but they owed much to the earlier civilization of other countries as well, especially to Egypt, Assyria, and Asia Minor. The genius of the Greeks showed itself in bringing to perfection the elements which they



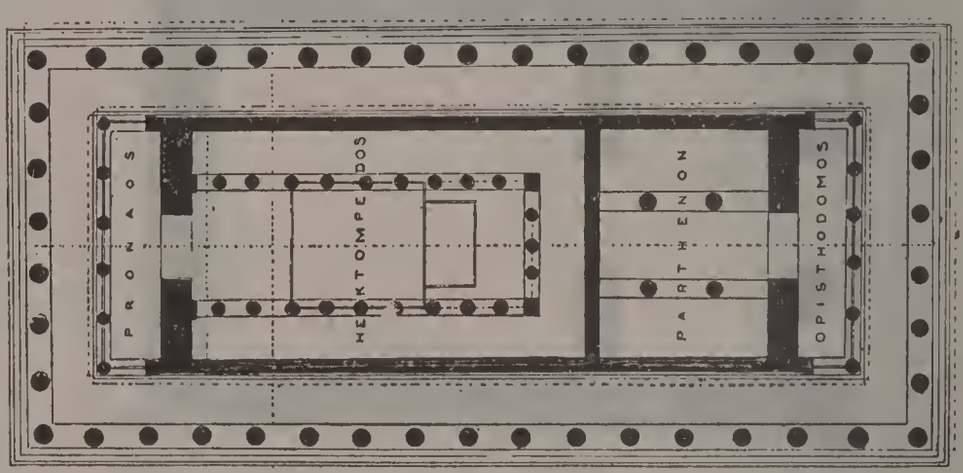
Templum in Antis.

borrowed. It is, however, impossible to trace the historic steps by which the different styles of Greek Architecture advanced, as we find it already in an advanced state of development at the beginning of the historic period. The oldest existing monuments of about 650 B. C. are already in completed form. What further changes took place are seen especially in the forms and styles of temple building.

Temple forms.—Greek temples are technically classed and designated by the mode in which the columns and porticoes are arranged. The oldest known form of a Greek temple consists simply of a single oblong room or cell with the entrance on one of the longer sides. Following this is the *templum in antis* in which the entrance is in one of the short sides and the two longer side walls are continued forward terminating in antæ or pilasters with two columns between. From this is developed the temple having the same arrangement of antæ and columns at both ends. In the *prostylos* form the side walls project beyond the end wall and end in antæ beyond which are

placed two corner columns, giving, with the two middle columns, a front of four columns. This form is rarely found. The *amphiprostylos* temple has columns both in front and behind. A good example of this is the well known temple of Nike Apteros on the Acropolis at Athens. It is to be observed, however, that this temple does not have the projection of the side walls ending in antæ.

When the temple was entirely surrounded by columns, it was called peripteral. The temple thus surrounded might be any one of the forms just described. In the case of the Parthenon the form of the temple within is amphiprostylos with six columns at each end. The larger temples were regularly divided into three parts known as the *naos* proper or *cella*, the *pronaos* or vestibule, and the *epinaos* or *opisthodomos* in the rear. To these in the case of the Parthenon was added a fourth apartment opening from the *epinaos* and used for storing the treasures of the temple. This room was known as the Parthenon and from this the name extended to the entire building.



Plan of the Parthenon.

Styles of Architecture.—We recognize three styles of Greek architecture: the Doric, Ionic, and Corinthian (see COLUMN), each reflecting to a marked degree the character of the people among whom it developed.

Doric.—This is the simplest and most dignified style of Greek architecture and is a suitable expression of the simple and serious nature of the Dorian Greeks. One of the earliest examples which remains is the temple at Corinth built in the 7th century B. C. The ruins of this temple show the various members of the style fully developed, but they are all massive and heavy and strongly suggest the architecture of Egypt as a prototype.

There is little doubt that the Doric style took its origin from the rock cut tombs of Beni Hassan in Egypt. The pillars of one of these tombs appears at first sight to be Doric; it is only on close inspection that we find that the echinus is lacking from the capital. It should be remembered, however, that the use of the column in architecture was known in Greece to the builders of the Mycenæan Age.

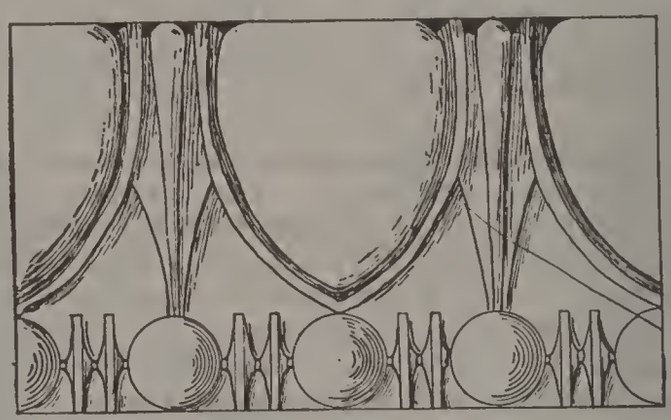
The straight trunk of a tree stuck into the ground as a support for a cross piece of the roof formed the first shaft of a column. When a flat stone or slab of wood was placed under it for a foundation, the first notion of a base was attained and a similar one placed on the top, to afford a broader surface for the cross beam to rest on, furnished the first capital. In fact it has been proved that the oldest known Doric structure, the Heræum, at Olympia, had columns of wood which were gradually replaced by columns of stone as the wood decayed.

After the temple at Corinth, the next remaining example is the temple at Ægina (q.v.), built about 550 B.C. It shows a later form of building both in the architecture and its sculptural adornment. There may have been many temples of the same date, but no others remain. They were probably destroyed during the Persian wars or removed to make way for finer buildings erected during the great era which succeeded those wars. Of this era we have many remains. The Theseum and the Parthenon at Athens, the temple of Zeus at Olympia, Apollo at Bassæ, the temple of Sunium, etc. All the best examples of the Doric style belong to the age of Pericles. Besides Greece itself there were the numerous important colonies sent out by the mother country where many remains of Greek architecture may be found. The Dorian colonists of Sicily and southern Italy carried with them the architecture of their native land and built many magnificent structures. Selinus in Sicily contains the ruins of the grandest ancient Doric temples in Europe. They were seven in number and the oldest is of about the same age as the temple at Corinth. At Agrigentum there are eight ruins of importance, among them the temple of Zeus, 363 ft. long and 182 ft. wide, the largest Greek temple of this period. Also at Syracuse, Segesta, and Pæstum are notable Doric remains.

As the Doric art progressed, the early massive forms gave place to more elegant and slender proportions. The thicker the columns are and the closer together they stand the older the temple. In the temple at Corinth the column is only 4.47 diameters in height; in the Parthenon, universally recognized as the finest example of the style, the column is 6.025 diameters in height; and in later instances it becomes still taller and thinner until it runs into the opposite extreme and becomes so meagre and attenuated as to lose entirely the bold vigor which is its chief characteristic. Similarly the entablature, which is excessively high and heavy in the earliest temples, becomes lighter and more artistic in proportion as we advance toward the best period.

The Doric style is admirable particularly for the beauty of the sculpture with which it is adorned and the appropriate manner in which the sculpture is placed. It was a fundamental principle to leave the supporting parts of the building plain and to decorate with sculpture only

spaces between the supporting members; chief among these were the spaces between the rafter ends, known as metopes, and the pediments or gables. It has been shown by Penrose, the distinguished English architect, that every line of the building was the subject of deep study for the purpose of correcting and allowing for all optical variations. The result is that there is hardly a single straight line, but all the lines which appear perfectly straight are slightly curved so as to produce the proper effect to the eye. For example, the columns swell slightly (see *entasis*); the architrave of the front is curved upward, so as to correct the optical illusion caused by the sloping lines of the pediment, and the columns lean slightly inward so as to give a greater appearance of solidity. The Parthenon, of which the illustration shows the east front, is built entirely of white marble and shows perfect workmanship in every particular. There is no doubt that this and other Greek temples were adorned with color. The colors

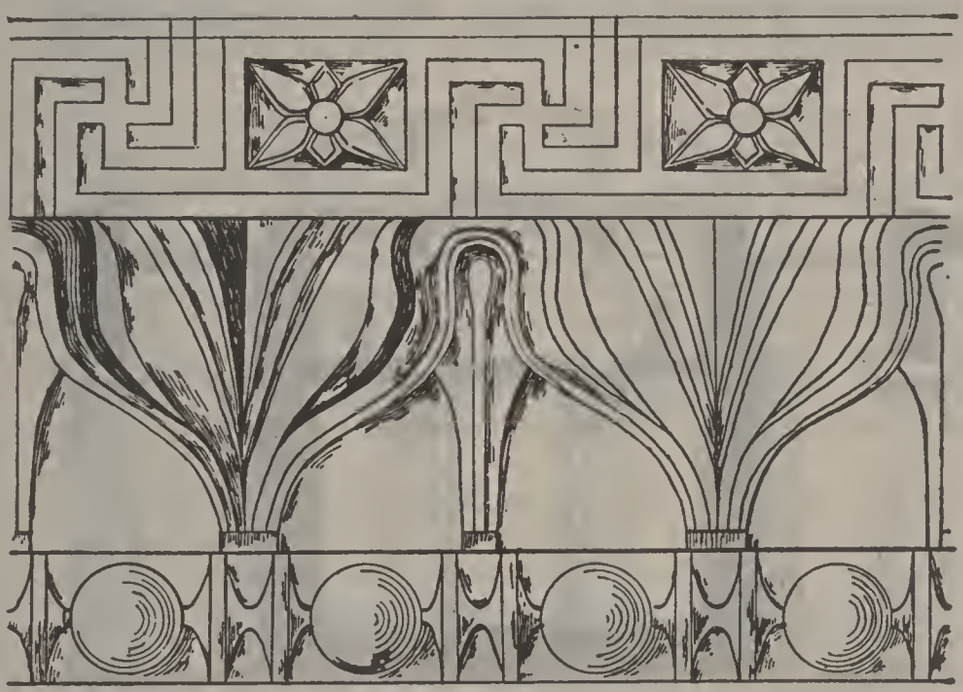


The Egg and Dart Ornament.

used were especially dark blue and dark red as a background for the sculptured reliefs in the metopes and pediments. The sculptured mouldings on the frieze and cornice were also painted or gilded. It is also probable that the exterior walls of the cella were covered with pictures sheltered from the weather by the projecting roof over the columns.

Ionic.—The lighter, nimbler, and more showy genius of the Ionian race appears in the order named after them. Many of its characteristics were borrowed from the people of the east, especially from the Assyrians. The volutes of the capitals are particularly indicative of an Eastern origin, the scroll being an ornament of very common use in all Eastern art. The order differs from the Doric in being lighter and more profusely ornamented. The columns are slimmer and loftier, their height being $8\frac{1}{2}$–$9\frac{1}{2}$ times the diameter of the base, and the distance between the columns is greater. The column has a base and its capital is adorned with sculptured ornament. The architrave instead of being in one plane surface is divided into three bands, one above the other, and above it rises the

frieze adorned with an uninterrupted series of reliefs. Finally the cornice is composed of different parts. The Eastern love of ornament is shown in the profuse use of bands of elaborate carving. Some of the most used are shown in the accompanying illustration. This order of architecture we find flourishing along with the Doric as early as 650 B.C. There are more examples of it in the Ionian and other colonies of Asia Minor than in Greece. The celebrated temple of Diana at Ephesus was of the Ionic order. It was one of the largest temples known, being 425 ft. long by 225 ft. wide. Recent excavations have brought to light many valuable remains of this famous building. The finest examples of the Ionic style remaining in Greece are the temples of Wingless Victory



Lesbian Cyma, a Variation of the preceding.

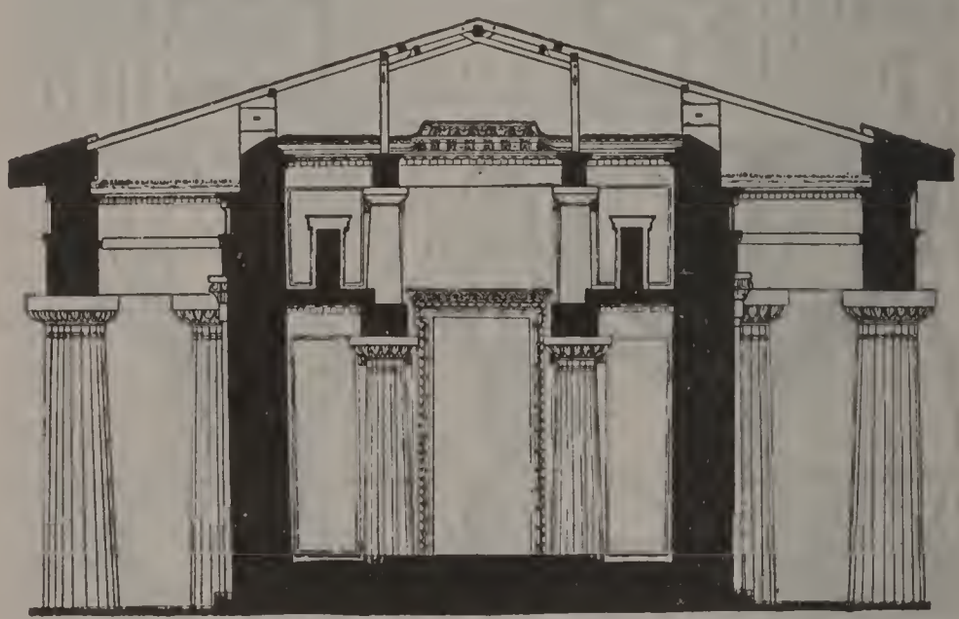
(Nike Apteros) and the Erechtheum at Athens, built about 450–420 B.C.

Corinthian.—The Corinthian order is essentially the same as the Ionic, the only difference of importance being in the capital of the column. It is as old as the other orders, the use of leaves or flowers for capital adornment being familiar to the Egyptians and Assyrians. It did not, however, come into common use until much later than the other orders.

The legend of the origin of the Corinthian style is pretty, but entirely false: a nurse had deposited, in a basket on the grave of a child, the toys with which the little one had amused herself. The basket was placed accidentally on the root of an acanthus, and in spring, when the leaves grew, they curled gracefully around the basket, and under a flat stone which was laid on top of it. Callimachus,

the sculptor, seeing it, caught the idea, and worked out at Corinth the beautiful capital since called after that city. This order with its gorgeous decoration first became fashionable about the time of Alexander the Great, the earliest and one of the finest examples extant being the Choragic Monument (q.v.) of Lysicrates (335 B.C.). There are also at Athens several other later buildings of this order, the most splendid being the temple of Olympian Zeus which was finished by Hadrian. The Corinthian is the most florid of the Greek styles and did not become popular until the flower of Hellenic genius had begun to fade. Its richness and splendor made it the greatest favorite with the Romans in whose hands Greek art spread over the whole empire.

To the orders of architecture above mentioned the Composite is sometimes added. This is, however, not a



Cross-section of the Temple of Neptune at Pæstum—A Restoration.

new order, but simply a mixture of the Ionic and Corinthian, the volutes of the Ionic column being combined with the foliage of the Corinthian. In exceptional cases the Greeks used figures of females (Caryatides) or of giants (Telamones) instead of columns. This idea may have been borrowed from the Egyptians, though they never used figures as columns, but placed them as statues in front of the columns.

Considerable doubt has existed as to the mode adopted by the Greeks for lighting the interior of their temples; that suggested by Mr. Fergusson seems most probable, as being similar to the plan used by the Egyptians and Assyrians. The interior had generally a double row of columns, one over the other, dividing the width into three spans. This arrangement still exists in the temple of Neptune at Pæstum. Mr. Fergusson supposes that the light was introduced by counter-sinking a part of the roof,

so as to admit the light between the pillars of the upper range, thus forming a kind of clerestory, as shown on the annexed illustration. Windows, however, also were used, as in the temple of Agrigentum and in the Erechtheum.

The theatres of the Greeks formed another very important class of works: they consisted of semi-circular rows of seats cut in the rock or partly built. Remains of these structures are found in all the countries inhabited by the Greeks, and frequently of great size. The proscenia were the parts on which architectural design was chiefly displayed; but, unfortunately, but scanty remains of these now exist.

Existing remains of Greek houses show that they were small and simple in design. The walls were built of sun-dried bricks and were coated with painted stucco. The mean appearance of the private houses was in striking contrast with the splendor of the public buldings and temples.

The attempt has been made in modern times to use Greek architecture and some ingeniousn modifications and adaptations of it have been made. But it was found that this style, beautiful and appropriate in the warm and genial climate of Greece, was quite unsuited for northern latitudes. Though its use in its entirety has been abandoned, hardly a building of importance is erected that does not in columns, sculpture or ornament revive the ancient Greek designs. In comparison with these all modern attempts seem crude, unartistic, and inharmonious.

GREEK CHURCH, The, or The Eastern Church: in its widest sense, comprehends all those Christians following the Greek or Greco-Slavonic rite, who receive the first seven general councils, but reject the authority of the Roman pontiff, and the later councils of the Western Church. The Greek Church calls itself 'the Holy Orthodox Catholic and Apostolic Church;' and it includes three distinct branches—the church within the Ottoman empire, subject directly to the patriarch of Constantinople; the church in the kingdom of Greece; and the Russo Greek Church in the dominions of the czar. The last must be alluded to in treating of its two sister-churches: for further details see Russian Church. The proper history of the Greek Church as a separate body dates from the commencement of the Greek schism, or rather from the commencement of the efforts on the part of the church of Constantinople to establish for itself a distinct jurisdiction and an independent headship in the eastern division of the empire. The ecclesiastical pre-eminence of Constantinople, followed on the political distinction to which it rose as the seat of the imperial residence, and the centre of the imperial government. Originally, Byzantium was but a simple episcopal see, subject to the metropolitan of Heraclea; but the rank of the see rose with the fortunes of the city; and before the close of the 4th c.,

a canon of the first council of Constantinople, 381, assures to it, on the ground that 'Constantinople is the new Rome,' the 'precedence of honor' next after the ancient Rome. This privilege, however, was purely honorary, and did not imply any pre-eminence of jurisdiction in the see of Constantinople, and there are many early instances in which questions arising within the district which afterward became the patriarchate of Constantinople, and even questions affecting the bishop himself, and even in his relations to the other patriarchs, were referred to the bishops of Rome. But the transition was not difficult, and was aided by the eminent qualities of some of the bishops, especially of St. John Chrysostom (see CHRYSOSTOM, JOHN); so that in the council of Chalcedon (451), a decree was passed, which confirmed the precedence already given, and not only assigned to Constantinople an extensive range of jurisdiction, but also grounded these ecclesiastical privileges in the case of the new as well as in that of the old Rome, on the political precedence to which both successively had risen. The Roman legates protested against this canon, and the claim led to a misunderstanding between the two churches, which was widened and confirmed by the doctrinal differences which prevailed on the Eutychian question, in which the patriarchs of Constantinople gave their support to the *Henoticon*, a heterodox or equivocal formula put forth by the Emperor Zeno, which was warmly resisted in the West. The pope, in consequence, 484, excommunicated the emperor, together with the patriarchs of Constantinople and Alexandria; and thus the East and West were, *de facto*, separated for nearly 40 years. The terms on which the excommunication was withdrawn by Pope Hormisdas, 519, involved a complete and explicit acknowledgment of the supremacy of the Roman pontiff; but the rivalry of Constantinople still subsisted. In the end of the 6th c., the Trullan Council (see TRULLAN COUNCIL) caused a renewal of the misunderstandings. Many circumstances combined to hasten a rupture: among these were, the claim to the title 'Ecumenical patriarch,' by the patriarch John the Faster, which claim was reprobated by Gregory the Great (see GREGORY I.); the contests about image-worship, in which the patriarchs in more than one instance took the part of the iconoclast emperors; the abandonment of the emperors of the defense of Italy against the Lombards; the gradual growth of an independent confederation of Italian states, and ultimately the foundation of a new empire of the West, the political antagonism of which with the eastern empire almost necessarily involved an antagonism of the churches themselves. Hence when, on occasion of his own personal contest with the see of Rome, the deposed patriarch Photius (862) (see PHOTIUS) identified his cause with that of the Eastern Church, he found a ready sympathy among his countrymen. The Latin

doctrine of the twofold procession of the Holy Spirit, and the addition of 'Filioque' to the Latin creed, the Latin practice of clerical celibacy, and of denying to priests the power of administering confirmation, supplied the grounds of quarrel; and though the Photian schism fell with its author, and the communion of the churches was restored, their reconciliation was imperfect and far from cordial. The same causes of controversy, with others of a disciplinary nature, were renewed in the 11th c.; and in 1054, the pope Leo IX. issued a formal sentence of excommunication against the patriarch Michael Cerularius, which was solemnly published in Constantinople by the papal legates. Beyond the points of difference alleged by Photius, the most important of the new grounds of division was the use of unleavened bread by the Latins in the eucharist. Since that time, the separation has been perseveringly maintained. More than one attempt was made by the authorities on either side to restore the former relations of the two churches, but in vain. The old antipathies of East and West became more inveterate by the separation; and the occupation of Constantinople by the Latins, 1201, the outrages and atrocities by which it was disgraced, the establishment of the Latin kingdom at Constantinople, and the arbitrary tyranny by which it was maintained, widened still more the ancient estrangement. Nor was the breach healed by the re-establishment of the Greek empire, 1261. The Western emperors, from political motives, pressed on all sides by the fears of foreign invasion and the embarrassments of domestic discontent, proposed, as the price of the assistance of the West in their necessity, the restoration of the Eastern Church to the obedience of Rome. Michael Paleologus (q.v.), by his ambassadors, abjured the schism at the council of Lyons, 1274, and endeavored, by a synod held subsequently at Constantinople, to obtain a ratification of the union; but he failed to gain the assent of the body of bishops, and in the succeeding pontificate, the breach was even more seriously renewed, by two synods at Constantinople, 1283 and 85. The necessities of John Paleologus compelled him once again to resort to the same expedient; and the negotiations for union were on this occasion conducted with much more deliberation. Delegates of the Greek Church with the patriarch of Constantinople at their head, attended at the great Western Council, 1437, of Ferrara (better known, from the place of its close, as that of Florence), and a protracted discussion took place, the chief points of which were the procession of the Holy Spirit from the Father and the Son, the addition of 'Filioque' to the creed, the nature of the purgation of souls after death, the use of unleavened bread in the eucharist, and the supremacy, by divine right, of the Roman pontiff. On all these points, the Greek delegates, with the exception of Mark, Bp. of

Ephesus, subscribed the decree of the council; but this union was equally short-lived. On the return of the delegates to Constantinople, their proceedings were repudiated by the large body of the Greeks; and the downfall of the Greek empire and capture of Constantinople by the Turks, 1453, obliterated every trace of the attempted reconciliation. Since that time, some isolated bodies of Christians of the Greek rite have joined the Rom. Cath. Church; but every attempt at a general union on the part of the Roman pontiffs has proved a failure. It has been the same with the attempts which have been made by the Prot. communions to establish an understanding with the Greek Church. Very early after the Reformation, a letter was addressed by Melanchthon to the patriarch Joseph of Constantinople through a deacon, Demetrius Mysus, who visited Germany 1558. Another Lutheran embassy of a more formal character, headed by the well-known Tübingen divines Andreæ and Crusius, visited Constantinople during the patriarchate of Jeremias, 1576–81; but both missions were equally without result. In the following century, the celebrated Cyril Lucaris (see LUCARIS), who had been educated in the West, and had carried home with him a strong, though for a time carefully concealed bias towards Protestantism, opened the way for negotiations with the Calvinistic party. Soon after his elevation to the patriarchate, he issued a decidedly Calvinistical confession of faith, 1629. But far from carrying his fellow-churchmen with him in the movement, the innovations which he attempted not only led to his own deposition and disgrace, but called forth a doctrinal declaration, signed by the patriarchs of Constantinople, Alexandria, and Antioch, and many metropolitans and bishops, which, by the clearness and decision of its definitions, draws the line so markedly between the Greeks and reformers as to shut out all possibility of accommodation in matters of doctrine. This exposition was adopted by all the churches; and in a synod in Jerusalem, 1672, it was adopted as the creed of the Greek Church. This declaration, originally drawn up by Magilas, metropolitan of Kiew, was published, 1722, by order of Peter the Great, as an authorized formulary of the Russian Church, under the title of *The Russian Catechism*. With a few exceptions, specified below, it coincides with the formularies of the Rom. Cath. Church.

The Greek Church comprised within its ancient limits, anterior to the Mohammedan conquest, Greece properly so called, the Peloponnesus, Eastern Illyricum, the Islands, and Asia Minor; also Syria and Palestine, Arabia, Egypt, and parts of Mesopotamia and Persia. But with the first triumph of the Koran, the church of Constantinople by degrees lost almost all her territory in Asia and Africa; and since the conquest of the Turks, it has sunk into the condition of a weak

and oppressed dependant. By the separation of the Russian branch, partially in the 17th, finally in the beginning of the 18th c., and by the separation of the new kingdom of Greece, on occasion of the revolution, its importance has been further diminished. Each of three divisions into which it has separated possesses a distinct organization; but as the faith and practice of all are substantially identical, it is best to glance first at the doctrines of the Greek Church, especially in their relations to the Christian communions of the West, and to the controversies by which the East and West are separated.

In general, it may be inferred from the fact that the Greek Church receives the first seven councils, that on all the controversies regarding the Trinity and Incarnation the Greeks are agreed with the Rom. Catholics, with the sole exception of the Roman dogma of the double procession of the Holy Spirit, in which they are at issue not only with Rom. Catholics, but probably with the great majority of Western Trinitarians (see FILIOQUE). While they reject the papal claim to supremacy and doctrinal authority, they agree with Rom. Catholics in accepting as the rule of faith not alone the Bible, including the Deuterocanonical books (see synod of Jerusalem in Harduin's *Coll. Concil.*, xi. col. 258), but also the traditions of the church, i.e., what are believed to be the unwritten revelations of our Lord and of the apostles, preserved by the testimony of the Fathers, among whom they regard with special veneration Basil, Gregory of Nazianzum, and Chrysostom. They admit the seven sacraments are received by the Rom. Church—viz., baptism, confirmation, eucharist, penance, extreme unction, holy orders, and matrimony; but in the rites used by them in the administration of these sacraments there are considerable discrepancies from the Latin rite. They administer baptism by a triple immersion; confirmation is administered in immediate connection with baptism, even in the case of infants, and it is administered by priests, and not, as among the Latins, by bishops exclusively. As to the eucharist, the Greeks admit the real presence of Christ, the transubstantiation of the elements, the propitiatory sacrifice, and (though this has been denied by some Prot. writers) the adoration of the host (see Renaudot *Liturg. Collectio,* i. pp. 22, 23). But they differ from Rom. Catholics in the use of leavened bread, in administering the communion in both kinds, and administering it in this form even to children. In the sacrament of penance, they recognize, like the Roman Church, auricular confession, priestly absolution, and penitential works; and though they differ from the Latins as to the use of indulgences, they admit the principle on which their use is founded, and even their applicability to the dead. For the peculiarities of their use of extreme unction, see EXTREME UNCTION.

In the sacrament of holy orders, they have many peculiar observances: see ORDERS, HOLY. The most striking point of difference regards clerical celibacy. The Greek Church recognizes the excellence of virginity, and the fitness of its observance by those engaged in the ministry, so far as to prohibit marriage altogether to bishops (who are always chosen, in consequence, from the monastic, and not from the secular clergy); to forbid priests or deacons to contract marriage after ordination; to forbid to all the clergy without exception, a second marriage, or marriage with a widow, and to require of married priests that they shall live separate from their wives during the time when they are actually engaged in church services. But they not only permit married candidates to be advanced to deaconship and priesthood, but even require, as a general rule, that they shall be actually married before they can be admitted to orders. While admitting marriage to be a sacrament, they hold it to be dissoluble in cases of adultery, and they regard fourth marriages as utterly unlawful. On the condition of souls after death, they do not admit with the Latin Church a purgatorial fire, but they admit the principle of the intermediate state of purgation, and of the practice of prayer for the dead. They admit also the intercession of saints, and the lawfulness of invoking them, especially the Holy Virgin Mary, and of honoring their shrines and relics. They do not permit the use of graven images, with the exception of that of the cross; but they freely permit and pray before pictures, which they hold in high honor, and on which they lavish most costly ornaments of gold, jewels, and other precious things. In their belief of the merits of good works, and especially of fasting, they go further than Rom. Catholics. Besides four yearly fasts—the 40 days of Lent, the season from Pentecost to the feast of Saints Peter and Paul, the 15 days before Assumption day, and the six weeks before Christmas—they observe Wednesdays and Fridays throughout the year as fasts. For their liturgy (see LITURGY) here it is enough to say that, in splendor of ceremonial, they are not inferior to the Westerns. Instrumental music, it is true, is forbidden in the churches, but singing is universally in use. In public prayer, the kneeling posture is used only at Pentecost; at ordinary times, they stand, facing toward the east. The use of the sign of the cross is habitual. The monastic institute has subsisted in the Greek Church from the earliest times, and numerous convents of both sexes are dispersed over the East, which follow almost exclusively the rule of St. Basil. The abbot is called Hegumenos, the abbess Hegumené; if several convents be subject to a single abbot, he is called Archimandrite. Both monks and nuns are bound by vows of celibacy. With both, the duty of manual labor is a leading observance; the nuns, like their western sisters, apply themselves to

the care of the sick and to the education of girls and young women.

As regards the separate constitution of the three great sections of the Greek Church, the church in the Turkish empire has remained subject to the patriarch of Constantinople, who from the beginning received a continued but precarious protection from the sultan, and even held, as regarded his own flock, a civil pre-eminence, with the rank of a 'pasha of three tails.' But in return for this civil status, the Porte claimed the right of appointing and also of deposing the patriarch, a right habitually exercised as a matter of purchase and sale, and which led to the grossest simony, not only as to the patriarchate, but in the entire ecclesiastical system. Formerly, the metropolitan of Russia (afterward patriarch) was subject to the patriarch of Constantinople, as were also the bishops of the modern kingdom of Greece; but both churches are now independent of Constantinople. The patriarch of Constantinople, Jeremias II., 1589, consented to the creation of a separate but dependent patriarch; and this dependence continued until the time of Peter the Great, by whom the patriarchate was first suspended and afterward abolished, the Russian church being now governed by what is called the Holy Synod, an ecclesiastical commission appointed by the czar. The independence of the church of the kingdom of Greece dates from the revolution. The 'organic law of Epidaurus,' of 1822, Jan., proclaimed the Oriental Orthodox Church as the church of the state, and soon afterward measures were taken to organize this church in the new kingdom. For a time, the patriarch of Constantinople hoped to preserve his ancient authority; but the president of the new state, Capo d'Istrias, firmly resisted, and, after many preliminaries, the new church was formally organized by a decree of 1833, July 15 (27), on a plan in great part borrowed from the constitution of the Russian Church, as settled by Peter the Great. The governing body in the church of the kingdom of Greece is, as in the Russian, the so-called 'Holy Synod,' which consists of five members, who are ordinarily archbishops or bishops, but may admit into their number also one or two priests or monks. This synod is the supreme ecclesiastical tribunal, and in name at least is independent in spirituals; but as its members are all named by the crown, and hold office but for a year, it is practically a state instrument; moreover, two officials of the crown have a right to assist, though without a vote, at all its deliberations. The synod elects bishops, but the crown has the right of confirming and granting investiture. To it also belongs the power of regulating the limits of dioceses, and all such general arrangements. The last remnant of subjection to Constantinople was removed by a formal recognition of independence 1868, and the bishops no longer seek consecration from

the patriarch of that see. In 1869, a correspondence took place between the Abp. of Canterbury and the patriarch, with a view to the union of the Anglican and Eastern churches; it brought no result. In the same year the government of Russia abolished the hereditary character of the Russo-Greek priesthood. The Russo-Greek Church is believed to number about 55,000,000. The Church of Greece comprehends a district of about 880 sq. m., and numbers about 800,000 members.

THE UNITED GREEK CHURCH comprehends those Christians who, while they follow the Greek rite, observe the general discipline of the Greek Church, and make use of the Greek liturgy, are yet united with the Rom. Cath. Church, admitting the double procession of the Spirit and the supremacy of the Roman pontiff, and accepting all the doctrinal decisions subsequent to the Greek schism which have force as articles of faith in the Roman Church. The United Greeks are found chiefly in s. Italy, in the Austrian dominion, in Poland, and in the Russian empire. In Italy, they are computed at 80,000; in Austria, at about 4,000,000; and in Poland, about 250,000. In Russia, it is difficult to ascertain their number. It has fallen off considerably in late years. In Austria, they are divided into Romanians and Ruthenians—the former being settled in Wallachia, Transylvania, and Eastern Hungary; the latter, in Little Russia, Galicia, and n.e. Hungary. The union of the Greek Christians of Wallachia and Transylvania dates from the end of the 12th c.; and though the Reformation made some progress among them, they still for the most part remain true to the union. The union of the Galician Greeks or Ruthenians is of much later date, about the close of the 17th c. (see RUSSNIAKS; RUTHENIANS). The usage of the United Greek Church as to the law of celibacy is, with the consent of the Roman pontiffs, the same as among the other Greeks. They are permitted also to administer the communion under both kinds.

GREEK-FIRE: composition supposed to have been of nitre, sulphur, and naphtha as a principal ingredient, with which the Greeks of the Byzantine empire were wont to defend themselves against their Saracen adversaries. The accounts of its effects are so mingled with obvious fable, that it is difficult to arrive at any just conclusion as to its power; but the mixture appears to have been highly inflammable, and to have been capable of burning under water. It was projected either on blazing tow, tied to arrows; or through a tube, the precursor of cannon. Wherever the combustible fell, it made great havoc, from the inextinguishable nature of the fire. The invention of this material has usually been ascribed to Callinicus of Heliopolis, A.D. 668; but there seems reason to believe that it was imported from India. At Constantinople, the process of making Greek-fire was kept a profound secret for several centuries.

The knowledge, however, of its composition gradually spread; and at the time of the discovery of gunpowder Greek-fire formed a recognized defensive element in most wars from w. Europe to Asia Minor. Subsisting for some time concurrently with gunpowder, it gradually died out before the advance of that still more effective competitor, till now little vestige remains of Greek-fire. See FIRE-ARMS.

GREEK MU'SIC, ANCIENT: subject of inquiry and discussion among the learned for hundreds of years. With the restoration of the arts and sciences at the end of the middle ages, the veneration for all that belonged to the Grecian people was carried to an extent that implied the indebtedness of the moderns to them for almost everything. Fortunately, various dissertations and fragments on music by old writers are extant, which, though not unfolding anything like a complete and satisfactory view of ancient Greek music, yet suffice to show that in ancient Greece the art of music was very imperfect; and that, in its elements and groundwork, it was entirely a slave to poetry, and could have been little else than a kind of intoned declamation. We find in old writers praise of the magic influence of music; but we must not forget that they used the word music in a collective sense for the gift of the muses generally; and when they spoke of the elevating and moral effects of music, it is to be understood that they meant a general harmonious cultivation of the arts and sciences. The system of music known to the ancient Greeks, and as practiced in their temples and theatres, differed essentially from our modern music, as their scale, or succession of sounds, was not based on the octave and its repetition, but on a fourth and its repetition. Their scale consisted of five tetrachords, each containing four consecutive sounds; the last sound of one tetrachord being always the first of the next; while two of their tetrachords had more than one sound in common. In modern music, the ancient Greek scale would be as follows: B, C, D, E; E, F, G, A; A, B♭, C, D, etc. This they called the diatonic genus. They had also their chromatic genus, thus B, C, D♯, E; E, F, G♯, A, etc; and their enharmonic genus, the tetrachords of which consisted of two quarter-tones (which cannot be expressed in modern music) and a major third. It is beyond a doubt that the ancient Greeks neither possessed a system of notation by which their music, such as it was, might have been preserved, nor had they any idea of harmony. Had it been otherwise, it is scarcely possible to imagine that the knowledge of it would not have been handed down to us. An ode by Pindar, and a hymn or two set in modern notation from an old Greek MS., is all that we can claim to possess of ancient Greek music, and even those are said by many to be spurious.

GREEK PHILOSOPHY. See PHILOSOPHY.

GREEK RELIG'ION, ANCIENT: most poetical and most humane of polytheisms, presenting itself in historical times as a plastic worship of nature, with its visible objects and its invisible powers; of abstract notions, sensations, propensities, and actions; of tutelary Numina, household or family gods; and of exalted men or heroes. Composed of such widely discordant elements, this good Hellenic Pantheon offers yet a unity so harmonious and consistent in its minutest parts that its origin is even more difficult to trace than that of the people itself, which, from a conglomeration of heterogeneous races and tribes, was fused in an incredibly short space of time into one great group of equal propensities and of nearly equal gifts. This question of the origin of the Greek religion has indeed been a point at issue from the time of Herodotus to our own. While he, together with many others, pronounced it to be almost completely an importation from Egypt, a strong autochthonic school held it to be homesprung; and these two antagonistic views—the East and Hellas—have, in a more or less modified form, found their foremost representatives in modern days in Creuzer on the one side, and Otfried Müller on the other. The new and important science of Comparative Mythology, however, may be said to have set this point at rest; for it proves, almost to demonstration, that the fundamental ideas of the Greek religion are due to the regions n.w. of India, the cradle of the main Hellenic stock (see ARYAN RACE); while subsequent colonists introduced additional gods from Phœnicia, Egypt, and other parts of the East. All these, with the host of personified fancies and ideals begotten by the poets at home, were soon amalgamated into one great system. Yet those foreign elements, so far from detracting from the originality of the Greeks, show in a still stronger light what brilliancy of conception and power of magination, what harmony and plasticity, had fallen to the share of the inhabitants of Hellas—a land which in itself, by the immense variety of glorious scenery of sea and sky, wood and mountain, river and bay, rock and island, contributed not a little to quicken that immortal youthfulness by which they were so aptly and strikingly called throughout the East the people of Yavan (Skr. *Yuvan* = *Juvenis* = *Young*). The gods, from the moment they touched these shores, from dead symbols became living realities, with all the qualities and sensations, aims and actions, of a living individuality, and that individuality the highest among earthly things—man. Anthropomorphism, indeed, is the chief characteristic of Greek religion. The brute creation—which to the East was something to be exalted, and to be adopted as the type of divinity—furnished the Greeks only with a few attributes for their humanly shaped gods. But man, the ideal of creation, was deficient in one thing, the duration of his life was limited; and in this the gods differed from him—they were immortal. In all other respects they were like himself—they loved and hated, they 'transgressed' and suffered. No ideal moral code existed with the Greeks; consequently, their gods, when they could not attain the objects of their many and

strong desires in a straightforward manner, had unscrupulous recourse to stratagem and cunning, and, through their questionable practices, not unfrequently brought themselves into very undignified positions. Yet the influence of such unworthy conceptions of the gods was not so immediately fatal, in a moral sense, to the believer as at first it would seem; for man's conscience still cast some dim light on character and duty, and did not fully accept the Greek deities as patterns for humanity; they were, through their mighty origin, their almost unbounded powers, and their immortality, exempt from the ordinary laws which must rule the dealings in the commonwealth of low, weak, dying humanity. They were a kind of exalted aristocracy, who could not be judged by a human standard, much less be imitated by human beings; and, after all, even they had to submit to a supreme fate (*Moira*), which found out their guilt, and punished it. The mortal, however, was subject to them individually; and it was his special province to fulfil the duties of piety and modesty toward them, of righteousness and justice toward his equals. On this condition alone, the undisturbed enjoyment of life, with all its most glorious gifts, was his. Retribution for evil doings followed, with rare exceptions, speedily and irrevocably. There was a hereafter, but it was a shadowy thing, without life and blood, a miserable nether world of cheerless twilight. Only for very extraordinary crimes was there something like a real, fearful, and everlasting punishment in store in the Hades, or the still more terrible Tartarus; while, on the other hand, only the most exalted heroes are, after their death, endowed with a new body and enjoy the pleasures of Elysium. But these are very exceptional cases: 'When a man is dead,' says the shade of Anticlea, 'the flesh and the bones are left to be consumed by the flames, but the soul passes away like a dream.'

In the Greek theology may be traced a historical development from the days when the early Pelasgians invoked, like their Persian and German kinsmen, the highest god without image or temple, and the minor deities as the 'Great Ones,' the 'Unknown Ones,' the 'Merciful Ones,' without distinct name and shape—to the time when every sound and every sight, every thought and every deed, had a significance as being caused and inspired by a god; when the prodigious number of clearly defined, and individually and most sumptuously worshipped gods formed a mighty impulse to the development of the arts: and from that period down to the days when the poets put prophecies of the speedy death of the gods into the mouths of their heroes; when philosophers, openly declared 'these things to be fancies and dreams,' and religious persecutions hastened the downfall of a creed which had become adulterated by foreign elements no longer to be amalgamated—until Christianity came forth, and not only deposed the gods of Greece, but sent them, branded with the names of 'evil powers,' or 'demons,' in the sense of eastern 'Satans,' to perdition. Around the Greek polytheism gathered innumerable myths and legends, traditional or invented in historical times by poets and phi-

losophers: these with the main system itself, and with its developed philosophy, had immense influence on other religions, the Christian among them. We trace here only the outward forms of the religious worship of the Greeks, in the so-called classical period: For some account of the principal deities, see their special titles.

Without entering into the principal division of the gods into heavenly, terrestrial, and maritime, we note the supreme council of the twelve national gods, who, with a vast male and female retinue, dwelt on the heights of Mount Olympus, around its highest peak. This peak reaching into the sky (Ouranos), was inhabited by Zeus (or Jupiter) son of Chronos—Zeus the highest, mightiest, and wisest being, king and father of gods and men: who watches over all human doings, principally over hospitality and the sacredness of oaths. Second in power is his brother Poseidon (or Neptune) shaker of the earth, ruler of the sea and all the waters of the earth. Next stands Apollo, son of Zeus and Selo (darkness); he (as Phoibos) is the sun, and darts his rays or arrows as god of the chase, as god of destruction, as well as of beneficence. But he is not god only of the physical, but also of the mental light; hence to him belongs the insight into future events. He is the god of oracles, but, as such, equivocal (*loxias*); further, god of poetical inspiration, song, and music—leader of the muses. He is one of the few sublime figures among the gods. In his love and in his hatred, he is always enshrouded in a sacred dignity, of which even the most ribald fiction stood in awe. The god of the terrestrial fire, which in his person had been thrown from heaven to earth, is Hephæstus (or Vulcan). His workshops are volcanoes, where metals are forged and wrought by him into artful forms; and as volcanic soil best matures wine, to him was assigned the office of cupbearer of the gods. Ares (or Mars) presides over war. Battles, slaughter, rapine, and the doom of cities are his delight. Hermes (or Mercury)—originally, perhaps, the symbol of animal generation—appears as patron of the herds. He is the guardian of the roads and the messenger of the gods; he is, moreover, the inventor of the lyre and gymnastics. He is the presiding genius of commerce, and, as such, a knave, even a thief. With Zeus is coupled Hera (or Juno), his sister and wife—beautiful, majestic, but exacting and quarrelsome. The foremost daughter of Zeus, and who sprang from his head in full armor, is Athens (or Minerva) who stands in a twofold relation to the light, physical as well as mental—whence she becomes the goddess of understanding and wisdom—and to the water (*Tritogeneia*); hence also her rivalry with Poseidon. The two elements, the warm and the moist, giving rise to the fertility of the earth, she is the goddess of the grain and of the crops; she is likewise goddess of war, and presides over female handiwork. Artemis (or Diana) twin-sister of Apollo, shares with him the chase and the light: her attributes are a torch and the moon. The Phœnician goddess Astarte had risen from the foamy waves on the Greek shores as Aphro-

dite (or Venus), the Greek goddess of beauty, of love, of voluptuousness. Her counterpart was the chaste maiden-goddess Hestia, in whom was personified the hearth as the centre of the house and family. From the perpetual fire on her altar, the colonists took the flame which was to accompany them to their new settlements. The list of the Olympians closes with Demeter or Gaia, goddess of agriculture, consequently, of settled institutions and laws.

An indefinite number of other gods followed, some of them little inferior in power and dignity to the twelve, and who sometimes, like Dionysus, the god of goat-herds and wine-growers, and others, acted as the special deities of certain classes. Of such were Hades, Helios, Hecate, Leto, Dione, Persephone, Themis, Eos; the Charites, the Muses, the Moeræ, Proteus, the Nymphs, and other *daimons*—partly primeval local deities, partly deified powers of nature; river, mountain, and forest gods; or personified abstract notions—such as Tyche, Psyche, Hebe, Thanatos, Phobos, Hypnos, Kratos, Bia, and the like conscious or unconscious allegories. Besides these, there is a mob of deities, or rather monsters, begotten by gods—the Harpies, the Gorgons, Pegasus, Chimæra, Cerberus, Scylla and Charybdis, the Centaurs, the Sphinx, etc.

A palpable link between gods and men is found in the heroes or demigods—i.e., men deified after death—a race sprung from the embraces of gods and the beautiful daughters of man. They became either, like Heracles (or Hercules) (the Phœnician Melkarth), founders of races, who were thus considered the sons of gods, or patrons of special trades and professions, like Dædalus, the *heros* of artificers and others. The absence of that dark and terrible, essentially Eastern, notion of an evil principle, co-existent with the good, between which two rival powers the world is divided; the undaunted geniality of the Greek nature; the tendency toward humanizing the whole universe and its gods, who, again, had not disdained to ally themselves with mankind; and above all, the emancipation from an all-ruling hierarchy such as swayed the East, made the Greek religion dogmatically, as well as practically, more bright and festive than the Eastern systems, as well as the most tolerant of ancient creeds. It was a Sadducean system, utterly unspiritual—an artistic, decorated, transfigured worldliness: the gods indeed were not heavenly beings; they were practically 'earthy'—of the earth and air and sea. The outward as well as the inward worship of the gods was with the Greek purely a personal affair. No mediator stood between the individual and the deity: every freeborn man, woman, and child had the undisputed right to pray and to sacrifice when and where he pleased. The only office of the priests consisted in the care of certain sacred property, in providing for the service of the temple, in the performance of certain traditional rites, the recitation of certain ancient formulas handed down in the priestly families, and the expounding of the will of the gods expressed by oracles. The Sacrifices (q v.), which in earlier days had consisted in the votive of-

fering of a lock, a garland, a tablet, or such simple fruits as were yielded by the soil, gradually, as hills and groves no longer sufficed, and temples, stately and sumptuous, adorned with gorgeous statues, had been erected, grew into splendid feasts, of which the gods were invited to partake, together with those who sacrificed. For the periodical festivals in honor of special deities, the games and sports, the scenic representations and musical contests connected with them, and of their peculiar influence in raising the literature, arts, and philosophy of the Greeks above that of all mankind, see FESTIVALS; DIONYSIA; PANATHENEIA; THESMOPHORIA; OLYMPIAN GAMES; PYTHIAN GAMES; NEMEAN GAMES; ISTHMUS, etc.

One of the most characteristic provinces of the Greek cult was that belonging to the mantics or diviners. The Greek, looking upon the gods as his omnipresent friends, who were able and might be willing to caution him against threatening dangers—or, in other words, convinced by his own strong sympathy with nature, that a derangement of his own affairs, however unknown to himself, must produce a corresponding derangement in nature—could not but give some credence to the foreboding significance of natural or 'supernatural' prodigies or signs. The ether or space between heaven and earth would be the principal scene of these revelations; the storms that swept through it, the thunder that rolled around it, and the birds that floated in the blue abyss, were all so many divine omens. No less would the gods speak in the offerings immediately addressed to them—in the innermost entrails of the sacrificial animal—in the flame that rose from their altar—in dreams of the night, and strange sounds and portents by day: thus if in the midst of the assembled people, an ominous animal appeared, they speedily dispersed. Yet the free and clear Greek mind could hardly sink into grovelling imbecility, as was the case in relation to augury with the Etruscans (q.v.); and Homer—though to the astonishment of Xenophon—puts into the mouth of Hector the momentous words: 'One omen only is significant—to fight for one's country!'

The growth of culture did indeed early free the Greeks from the vague awe of everyday phenomena, and the science of manticism fell accordingly into the hands of the lowest jugglers and soothsayers, believed in only by the herd. But in the same degree, there rose into importance another and exalted kind of prophecy—the Oracles (q.v.). In this, the god Jupiter—afterward principally Apollo, his son, partaker in his counsels—spoke himself: first, in the rustling of leaves, in the clangor of brass basins, later, in distinct human words. He chose the weakest vessels—women, girls, to whom the divine gift was a burden and a pain. The Sibyl herself does not understand what the god says through her mouth; she is unconscious—in a state of somnam-

bulism—of mania. But here the priests step in; they act as interpreters, as prophets, as *Evangelides* (the progeny of some *Evangelos*), 'bringers of good tidings.' Their influence, socially and politically, increased with that of the oracles themselves, especially when these latter, by degrees, from being casual and unforeseen, became frequent and regular. The richest gifts poured in from all parts, as it grew matter of piety to have recourse to them as means of grace. They thus rose into an institution, the importance of which, principally for the unity and consequent rise of Greece as a political power, is not easily overrated. Besides the oldest oracle—that of Jupiter and Dodona—there were 260 counted throughout Greece; among them those of Didyma, Delos, Abæ, Klaros, Larissa, Tegyra, of Trophonius—in a subterranean cavern—and of Amphiaraus, near Oropus, in Attica, where the answers were revealed in dreams. But by far the most famous, and of highest import for the whole nation as such, was that of Delphi (q.v.), where the Amphictyonic council was held; where everything connected with the public worship throughout the country was settled; where the calendar itself was regulated; where, in fact, for a very long time was the real central power of Greece. The voice of the oracle ceased under Julian the Apostate.

GREEK THEATRE, First in America, the gift of William R. Hearst to the University of California, is exactly similar in its proportions to the famous theatre of Dionysius at Athens.

The structure was used for the first time at the University of California commencement 1903 when President Roosevelt was the orator of the day. It was then learned that every one of the 8,000 spectators seated in the theatre could hear with perfect distinctness.

No roof shuts out the sunlight or starlight from the audience. The entire structure is white; the hangings are a blending of the Greek and Roman colors.

Though this theatre is modeled in a general way after the ancient classic buildings of a similar character, no single historic example has been literally followed. The theatre at Epidaurus, in Greece, however, offers many points of similarity, notably in the difference of slope between the upper tiers of seats and the inner and lower portions of the auditorium. The new theatre is of approximately the same size as the larger theatre at Pompeii.

The building is, as a whole, made up of two separate and distinct parts, namely, the stage, corresponding to the ancient logeion, and the auditorium.

The floor of the stage is 133 feet wide and 28 feet deep. It is entirely open toward the auditorium and surrounded on the other three sides by a wall 42 feet in height. This wall, which corresponds with the ancient skene, is enriched by a complete classic order of Greek Doric columns with stylobate and entablature,

the ends of the side walls toward the auditorium forming two massive pylons. Five openings pierce the wall, the entrance in the centre of the back of the stage being the most important—the so-called royal door of the ancients. This is flanked by two minor doors to the right and left, the two remaining openings occurring on the return walls at either end of the stage.

The auditorium or theatre proper is semi-circular in form, 254 feet in diameter, and is divided into two concentric series or tiers of seats. The first series is arranged about a level circle 50 feet in diameter and 5½ feet below the stage, which corresponds to the space anciently devoted to the chorus, orchestra, etc.

From this circle the receding rows of seats step up gradually until the stage level is reached at a circle corresponding in diameter with the terminal pylons of the stage wall. This line is marked architecturally by a passage, anciently named the diazoma or diodos, running around the semicircle of seats midway between the orchestra and the topmost circle. The diazoma is protected on its outer side by a wall, beyond which the seats step up more steeply, approximately at an angle of 30 degrees with the horizontal, to the outer limit of the theatre.

It is estimated that more than 7,000 persons can be seated in the theatre proper. The stage will accommodate some 600 more.

GREELEY, *grē'lĭ*, Colorado, city, cap. of Weld co., on the Cache la Poudre river, and the Union Pacific and the C. & S. railroads, about 50 m. n. of Denver. The place was settled in 1870, by a colony composed mainly of New England people, and named for Horace Greeley, the famous editor. It was incorporated a year later. The government is administered by a mayor, elected biennially, and a city council. The waterworks and other public utilities are owned by the municipality. The city is in the center of a beautiful valley, made fertile by irrigation, and which is rich in coal, building-stone, and timber. Extensive shipments are made of potatoes, sheep, cattle, flour, wheat, etc. There is a beet sugar factory, several lumber yards, an elevator, a tannery, flour-mill, and other industries. It is a thriving, clean, and progressive town, and is visited annually by many tourists on account of its unique characteristics. The sale or giving away of liquors is strictly prohibited, and other idealistic principles are enforced. Although not strictly a communistic settlement, the ideas of communism prevail to a considerable extent, and in many ways the citizens advance their common interests by a combination of effort. For instance, the original 50,000 acres allotted to agriculture is enclosed by a single fence 45 m. long, and the irrigation canal 36 m. in length is a work of common interest. The place is well supplied with good schools, churches, newspapers, banks, and other utilities of a high civilization. Pop. (1910) 8,179.

GREELEY.

GREELEY, *grē'lĭ*, HORACE, LL.D.: 1811, Feb. 3—1872, Nov. 29; b. Amherst, N. H.: journalist. He was of Scotch-Irish ancestry, precocious and feeble as a child, fond of books, and bred to farm life. After several attempts he succeeded in entering apprenticeship to the printer's trade in the office of the *Northern Spectator*, E. Poultney, Vt., 1826. He soon became a skilled typesetter, and was beginning to attract attention as a contribution of political, economic, and agricultural articles to the paper when it was suspended 1830. Released from his apprenticeship, he spent over a year tramping through the country, and working in printing offices wherever he could find opportunity, and arrived in New York in about the same plight as that in which Franklin reached Philadelphia, 1831, Aug. 17. He worked as journeyman printer in various offices till 1833, Jan. 1, when, in conjunction with Francis Story he started the first daily penny paper ever printed, the *Morning Post*. The paper was suspended in less than a month, but the job-office was kept running till the death of Mr. Story in July following. In 1834, Mar., Greeley formed a partnership with Jonas Winchester, and started the *New Yorker*, a weekly paper devoted to literature, politics, and news. This paper gained rapidly in circulation and lost steadily in capital, and Greeley was obliged to engage also in other work. He wrote editorials for the *Daily Whig*, and while continuing his *New Yorker*, was selected by William H. Seward and Thurlow Weed to conduct the *Jeffersonian*, a weekly whig campaign paper 1838. The *Jeffersonian* was published one year, and in 1840, May, Greeley started a new campaign paper, the *Log Cabin*, in the interest of the presidential candidacy of Gen. William Henry Harrison. This attained remarkable circulation, was published simultaneously in New York and Albany, and brought its editor into national prominence. His judgment and influence were sought on the stump and in the council, and he was especially fortunate in being able to adjust numerous political differences among the whig leaders. At the close of the campaign he merged the *New Yorker* and the *Log Cabin* into a new venture, and 1841, Apr. 10, brought out the first issue of the *Tribune*, with which he remained connected till death. Though active and influential in political councils and on the stump and lecture platform, Greeley did not become a political office holder till 1848, when he was elected a member of congress to fill a vacancy, and served three months. While in congress he made a sturdy fight against the abuses of the mileage system, and created wide-spread hostility by publishing in the *Tribune* a list of the mileage accounts of members of congress with free comments. He also introduced the first bill to give homesteads, free, to actual settlers on the public lands. The year of his election to congress he vehemently opposed the Mexican war, declaring its simple purpose to

be the addition of more slave territory to the general domain; and his early anti-slavery convictions were intensified from this time forward. In 1851 he made his first trip to Europe, and was appointed a juror of the World's Fair in London. He also testified before a parliamentary committee on newspaper taxes. After his return to New York he gave his sympathies and influence to the free-soil movement, and though opposing the whig platform supported Gen. Scott, the whig candidate for pres. 1852. In 1854 he announced 'the dis solution of the political firm of Seward, Weed, and Greeley, by the withdrawal of the junior partner,' and in the following year made a second trip to Europe to attend the French exhibition. In 1856 he gave a vigorous support to the presidential candidacy of John C. Fremont, was indicted in Va for circulating the *Tribune*, there declared an incendiary document, and was personally assaulted in Washington. With pen and voice he labored indefatigably and successfully to secure the admission into the Union of Kan. as a free state, and his name was bitterly denounced through the South. In 1859 he made a trip across the plains to California and was enthusiastically received in San Francisco and Sacramento. The approach of the civil war brought him great mental distress. He labored with all his vigor to prevent a resort to arms, but when the crisis seemed inevitable he stood up in the national republican convention at Chicago (1860, May) and demanded a thorough and unflinching prosecution of war measures. After the attack on Fort Sumter he raised the cry 'On to Richmond,' and to the close of the war supported the govt.—sometimes, however, sharply censuring its delay—in its attempts to crush rebellion, encouraged volunteering, sustained the drafts, and pleaded powerfully for the legal removal of what he deemed the cause of the war—slavery. In 1864, with the sanction of President Lincoln, he made an unsuccessful attempt to negotiate a termination of hostilities, was a presidential elector for the state of N. Y., and a delegate to the Loyalist Convention at Philadelphia. After the final surrender (1865) Greeley became as earnest in advocating pacific measures, impartial suffrage, and universal amnesty as he had been in demanding a vigorous prosecution of the war. He opposed the action of the federal govt. in holding Jefferson Davis a prisoner without trial, and oblivious to all personal and pecuniary consequences, went to Richmond, and in open court signed the bail-bond of the ex-Confederate president. In 1867 he was a member of the N. Y. convention for revising the state constitution; 1868 supported the presidential candidacy of Gen. Grant, though dissatisfied with the party's choice of a candidate; 1869 was defeated as candidate for state comptroller; 1870 was defeated for congress though he polled an unusually large vote; and 1871 made a trip through Tex. to study the effects of the

govt. reconstruction measures. During the latter year a number of the most eminent republicans in and out of congress, dissatisfied with various features of President Grant's administration, united in forming the 'liberal republican' party. The first convention was held in Cincinnati 1872, May 1, to nominate a candidate for pres. against President Grant. On the 6th ballot Greeley received 482 votes and Charles Francis Adams 187, Greeley was declared the choice of the convention for candidate for pres., and Gov. B. Gratz Brown for vice-pres. In July following, the national democratic convention also nominated Greeley for the presidency. President Grant was renominated by the national republican convention. The elections resulted in a popular vote of 2,834,079 for Greeley and 3,597,070 for President Grant, who also had 286 electoral votes. The canvass was one of the most remarkable on record, and the work in it of Greeley was simply marvellous. The loss of his wife during the canvass and the excessive toil and intense excitement to which he had been subjected, brought on inflammation of the brain, from which he died three weeks after the election. His funeral was the occasion of an imposing demonstration in New York, in which the pres., vice-pres., and chief justice of the United States participated.—Greeley interested himself in various plans and theories for the reform of society. In all that he undertook he was indefatigable, independent, and courageous. His tastes were not scholarly; but he was master of an almost perfect style for political disputation, simple and clear, vigorous and keen. He was for many years an active member of the American Institute and the Farmers' Club. He was author of *Hints Toward Reforms* (New York 1850); *Glances at Europe* (1851); *History of the Struggle for Slavery Extension* (1856); *Overland Journey to San Francisco* (1860); *The American Conflict,* 2 vols. (1864,66); *Recollections of a Busy Life* (1869); *Essays on Political Economy* (1870); and *What I Know of Farming* (1871).

GREELY, *grē'lĭ*, Adolphus Washington: b. Newburyport, Mass., 1844, Mar. 27. He graduated at the Brown High School 1860, enlisted in the 19th Mass. inf. 1861, was appointed 2d lieut. 81st U. S. col'd inf. 1863, Mar. 18, promoted to 1st lieut. 1864, Apr. 26, bevetted maj. of vols. for services during the war 1865, Mar. 13, appointed 2d lieut. 36th U. S. inf. 1867, Mar. 7, assigned to 5th U. S. cav. 1867, July 14, and promoted 1st lieut. 1873, May 27. From the close of the civil war till 1881 he was on detail duty in the U. S. Signal Service. In that year he was appointed commandant of the govt. expedition to the arctic regions to establish circumpolar stations for scientific purposes. He reached Discovery Harbor 1881, Aug. 12, and was rescued with 5 men out of his force of 24—all at the point of starvation—by the third relief expedition sent after him at Cape Sabine, 1884, June 22, the remainder of his party having

perished. He was promoted capt. 1886, and appointed chief signal officer with the rank of brig.gen. 1887. During the Spanish war, 1898, he very ably managed the signal corps. He was promoted to the rank of major-general 1900, Feb. 10, and retired 1908, Mar. 27.

GREEN, a. *grēn* [Icel. *græ*, to grow; *grœnn*, green: Dut. *groeyen*, to grow; *groen*, green]: of the color of plants or herbage; verdant; flourishing; fresh; not dry; half-raw; unripe; inexperienced: N. a color (see GREEN COLORS): a small grassy plain. GREENS, n. plu. *grēnz*, certain fresh vegetables dressed for food. GREEN'ISH, a. somewhat green. GREEN'LY, ad. *-lĭ*. GREEN'NESS, n. quality of being green; unripeness; freshness; vigor; inexperience. GREEN-BONE, two kinds of British fish, as the garfish or sea needle, so called from the color of their bones when dressed. GREEN-CROP, a crop, such as grasses, turnips, etc., used chiefly as fodder for cattle. GREEN-EARTH, an earthy variety of chlorite, occurring in various shades of green; often found filling the cavities of amygdaloid, or incrusting agates in that rock, sometimes also massive or disseminated, chiefly in trap rocks: it consists principally of silica, alumina, and protoxide of iron, the silica constituting about one-half. It is used as a pigment by painters in water-colors, who know it by the name of *Mountain Green*. In N. J., green earth is used as a manure, and is said to be very beneficial. GREEN-EYED, having eyes that see through a false medium as if colored with green; jealous. GREEN-MANTLED, covered with verdure. GREEN-GOOSE, a young goose, so named from the color of its hairy covering; more likely a mere corruption of *grain-goose*, that is, a young bird fattened on grain, etc., for the table. GREEN-GROCER, one who deals in vegetables and fruit. GREEN-HAND, one raw and inexperienced. GREENHORN, n. an ox with his horns just beginning to appear; a raw youth easily imposed upon; one unacquainted with the world. GREEN-ROOM, n. in a *theatre*, the actors' retiring room, perhaps originally so named from its rustic character or prevailing embellishments. GREEN-SICKNESS, a disease in which the person affected has a sickly paleness with a green tinge of the complexion, chiefly confined to unmarried women; chlorosis. GREEN-SWARD, n. turf on which grass grows. GREEN WOOD, unseasoned wood; a wood or forest when the leaves are out. GREEN TEA, a name of several commercial varieties of tea. GREEN TURTLE, the species of turtle imported as a luxury for making turtle soup. SCHEELE'S GREEN, vivid light green pigment, consisting of arsenite of copper.

GREEN, ANNA KATHARINE. See ROHLFS, ANNA KATHARINE.

GREEN, *grēn*, ASHBEL, D.D., LL.D.; 1762, July 6—1848, May 19; b. Hanover, N. J.: Presb. clergyman He served in the revolutionary army 1778-82, graduated

at the College of New Jersey 1784, was tutor there one year, chosen prof. of mathematics and natural philosophy there 1785, licensed to preach 1786, and installed pastor of the Second Presb. Church, Philadelphia, 1787, with which he remained till 1812. In 1792 he was elected chaplain of congress, and 1812 pres. of the Princeton Theological Seminary (Presb.), and held the latter office 10 years. He was a staunch 'Old School' Presb., had great weight of character, and was a forcible preacher. He edited the *Christian Advocate* 1822–34: published *Discourse delivered in the College of New Jersey, with a History of the College* (1822); *Presbyterian Missions, Sermons on the Assembly's Catechism, Sermons from* 1790 *to* 1836, *Reports and Addresses from* 1793 *to* 1836, and an addition of Dr. Witherspoon's works. He received the degree LL.D. from the University of N. C. 1812.

GREEN, Bartholomew: 1666, Oct. 12—1732, Dec. 28; b. Cambridge, Mass.: printer. He learned the printer's trade with his father, succeeded to his business, removed his press to Boston, and brought out the first number of the *Boston News Letter* 1704, Apr. 24, which he edited and published till his death. He was govt. printer 40 years, and for 15 years his newspaper was the only journal regularly issued in the American colonies.

GREEN, Beriah, American abolitionist: b. New York State 1794; d. 1874. He was educated at Middlebury College, Vermont, became professor of sacred literature in Western Reserve College in 1821, but was compelled to resign in a few months through the opposition aroused by his anti-slavery views. He was for many years president of the Oneida Institute, Ohio. He was a great friend of William Lloyd Garrison, and exerted a wide influence in abolitionist circles. Among his writings are *History of the Quakers* (1823).

GREEN, Duff, American politician and journalist: b. Woodford County, Ky., 1791; d. Dalton, Ga., 1875. He served with the Kentucky militia in the war of 1812; after the admission of Missouri as a State was appointed State Senator (1823), and became editor and proprietor of the St. Louis *Enquirer*. In 1825 he removed to Washington, D. C., where he purchased the United States *Telegraph*. This became the administration organ, and Green rose to high favor with President Jackson. He was a member of the 'Kitchen Cabinet.' After the rupture between Calhoun and Jackson, the *Telegraph* as the organ of the nullificationists bitterly attacked Jackson. After some years spent in Europe he returned to the United States (1844) and edited a short-lived newspaper in New York. During the latter years of his life he was actively engaged in promoting the development of the South, and was one of the founders of the town of Dalton, Ga.

GREEN, Hetty Howland Robinson, American finan-

cier: b. New Bedford, Mass., 1835, Nov. 21. She is the richest woman in America and probably the boldest and ablest woman financier of her time. Although she has an interest in nearly every large corporation and important enterprise in the world, she manages personally her own property in stocks, bonds and real estate in Chicago, New York and elsewhere.

GREEN, JACOB: 1722, June 22—1796, May 24; b. Malden, Mass. He worked at a trade to pay his way through college, graduated from Harvard 1744, became pastor of a Presb. church in Morristown, N. J.; also practiced medicine. He was chosen president of the College of New Jersey, was delegate to the N. J. provincial congress 1775, and was chairman of the committee by which the state constitution was drafted. He wrote largely on finance, and published two vols. of *Sermons*. His *Autobiography* appeared in the *Christian Advocate*.

GREEN, JOHN CLEVE: American merchant and philanthropist: b. Lawrenceville, Mercer County, N. J., 1800, April 14; d. New York 1875, April 28. He entered a counting-house in New York, went as supercargo to South America and China, and in 1833 became a member of the firm of Russell & Co. at Canton. In 1839 he returned to New York, where he continued in the Chinese trade. For many years he was a director of the Chamber of Commerce, and officially connected with numerous public and charitable institutions. He was liberal in his gifts, particularly to New York University, and Princeton University. At Princeton he established (1873) the John C. Green School of Science by the gift of $50,000, subsequently increased by the residuary legatees. In this school instruction is given in general science, civil engineering, and electrical engineering. The courses are four years in length and lead to the degrees of bachelor of science, civil engineer and master of science. The endowed proprietary school for boys at Lawrenceville, N. J., was re-established in 1882 upon a gift from the executors of his estate known as 'The John C. Green Foundation.'

GREEN, JOHN RICHARD, LL.D.: 1837–83, Mar. 9; b. Oxford, England: historian. He received his early education at Magdalen College School, studied with private tutors 3 years, obtained a scholarship at Jesus College, Oxford 1855, took his degree 1860, received holy orders and was vicar of St. Stephen's Church, Stepney, till 1869, when he resigned and was appointed by the Abp. of Canterbury librarian at Lambeth Palace. While an undergraduate he became an enthusiastic student of history, and while holding his vicarage he divided his time between parochial duties and historical study in the British Museum. After his appointment to the Lambeth library he set himself to work as a historian, and 1875 produced his first great work, *A Short History*

of the English People, which had immediate and abundant success. Without allowing himself rest he began elaborating the work, and 1877–80 brought it out in 4 vols. under the title *A History of the English People.* He afterward edited a series of *Historical Primers,* published *The Making of England* (1882), and nearly completed *The Conquest of England,* which his widow finished and issued. His health was feeble from a child, and he died while seeking recuperation at Mentone, France.

GREEN, Joseph, American poet: b. Boston, Mass., 1706; d. London, England, 1780, Dec. 11. He was graduated at Harvard 1726, and was famous for his wit and satirical powers. During the war of the Revolution he was prominent on the Loyalist side. His works include: *The Wonderful Lament of Old Mr. Tenor* (1744); *Poems and Satires* (1780).

GREEN, Seth, American pisciculturist: b. Irondequoit, N. Y. 1817, March 19; d. Rochester, N. Y., 1888, Aug. 20. He learned the natural history necessary for his profession from observation and private reading, and began his life's work by artificial hatching of trout roe. He was looked upon as the leading expert in this department of fish culture, but his first great triumph in new fields came with his success in the reproduction of shad. The Seth Green shad-hatching box was invented in 1867, and, although it has been superseded, by this device shad culture was first demonstrated to be possible and its inventor must be looked upon as the pioneer in this difficult department of pisciculture. The Connecticut River was restocked by means of this invention. In 1868 he was made fish commissioner for the State of New York, and the following year undertook the artificial reproduction of whitefish. He was successful in his experiments, and was acknowledged as one of the fathers of fish culture in the United States. From 1870 until his death he was superintendent of the state hatchery at Caledonia, N. Y.

GREEN, Thomas Hill, English philosopher: b. Birkin, Yorkshire, 1836, April 7; d. Oxford, 1882, March 15. He was educated at Balliol College, Oxford, where he was elected fellow in 1860, tutor in 1866, fellow again in 1872, and, in 1878, Whyte professor of moral philosophy. As opposed to the view that man is a mere product of natural forces, Green maintained that he is an end in himself, in whom the thought and perfection of an infinite intelligence are gradually being reproduced. His philosophy is based upon Kant and Hegel, and he was leader of the Neo-Hegelian movement in England. In ethics he was also greatly influenced by Aristotle, and his theory is described as that of self-realization. His most important work, *Prolegomena to Ethics,* was published shortly after his death. His other chief works, with a memoir, edited by Nettleship, were published in 3 vols. (2d ed., London, 1890).

GREEN, William Henry, D.D., LL.D.; Presb. clergyman; b. Groveville, N. J., 1825, Jan. 27; d. 1900, Feb. 10. He graduated at Lafayette College 1840, studied in the Princeton Theol. Seminary, became tutor there 1846, was ordained to the ministry 1848, and installed pastor of the Second Presb. Church, Philadelphia, 1849. In 1851 he was chosen prof. of Hebrew and Old Test. literature in Princeton Theol. Seminary, and held the office till death. He was a profound scholar in his department, and was chairman of the Old Test. company of the American Bible revision committee. He declined the presidency of the College of New Jersey 1868. He was author of a *Hebrew Grammar, Hebrew Chrestomathy, The Pentateuch Vindicated from the Aspersions of Colenso* and *The Argument of the Book of Job Unfolded.*

GREENAWAY, *grēn'a-wā*, Kate, water-color artist; b. London, England, 1846; d. there 1901, Nov. 8. She was the daughter of a wood-engraver, received her first instructions in drawing from him, and afterwards studied in London and S. Kensington. She exhibited first in the Dudley Gallery 1872–3, and then began making designs for juvenile books and of juvenile subjects. Her draperies of children so pleased the popular fancy that many were adopted in England and the United States as designs for children's costumes. She contributed to the *People's Magazine* of London; illustrated *Mildred's Mistake* and *Topo* (1876–7); and published *Kate Greenaway's Little Folks' Painting Book* and *Under the Window* (1879); *Kate Greenaway's Birthday Book* (1880); *Mother Goose* and *A Day in a Child's Life* (1881): pictorial edition of *Little Ann* (1883), *Language of Flowers* (1885).

GREENBACK-LABOR PARTY, or National Party. The workingmen during the 'panic years' (1874–8 increasingly resorted to political activity to right their grievances, and in Ohio in 1877 began to call their local organization the 'National Party.' In Massachusetts and Pennsylvania they fused with the Greenback Party (q.v.). In 1878, Feb. 22, at Toledo, Ohio, they held a convention which organized the fusion as the 'National Party;' but the popular name for it was the old fusion name 'Greenback-Labor.' Their platform was the Greenback one, with planks against prison contract labor and in favor of legislation for shorter hours. The new organization awakened hopes in the hopeless minorities in several States where the majority, Republican or Democratic, could not be overturned; and they organized fusions with it, which raised it at once to a popular vote (apparently) of over 1,000,000, and elected 14 Congressmen. In the close States each old party kept its own vote, with a slight falling off to the new one. The party proper elected but two representatives, five of the 14 being really Republicans and seven Dem-

ocrats. In 1880 (June 9–10) it held a national convention at Chicago, and nominated James B. Weaver of Iowa, and B. J. Chambers of Texas, for President and Vice-President; Chambers declined, but no substitute was nominated. The platform had all the old planks in substance, and new ones against Chinese immigration, land-grants to railroads, and favors to corporations and bondholders, and in favor of sanitary regulations for manufactories. The fusions had largely disappeared, and the popular vote sunk to 306,867, and the Congressman to eight; four from Missouri, two from Maine, one from New York, and one from Texas. It retained its organization till 1884, when it fused with the Anti-Monopoly Party (q.v.) and nominated Benjamin F. Butler for the Presidency, polling in all 175,380 votes. It then practically disappeared.

GREENBACK PARTY (its own name INDEPENDENT PARTY), 1874–6. The prosperity of western agriculture during the War, due largely to the heavy government purchases and the payability of mortgages in depreciated paper, was attributed by a large section there to the plentifulness of the paper by itself; hence, when hard times had succeeded, it was believed that a fresh inflation of greenbacks would produce the same conditions. The chief obstacle to this was thought to be the eastern banking interests, which, having bought government bonds in greenbacks, had obtained the act of 1869 making them payable in coin whether so specified or not; and should have been forced to take what they gave, the more since paper was now at par and their bonds were not taxed. By 1868 the Ohio Democrats, led by George H. Pendleton, were insisting on the payment in greenbacks of all bonds not specifically payable in coin, as the 5–20's; this was called the 'Ohio Idea.' Western Democratic conventions placed this plank in their platforms for three or four years, but the nomination of Greeley put an end to that in 1872. The revival of greenbackism is often attributed to the silver demonetization act of 1873; but in fact silver was above par at that time, the act drew no general attention, and but for the later fall in silver probably never would have done so. The real cause was the bringing forward of the Resumption Act, passed 1875, Jan. 14, to take effect 1879. In 1874, Nov. 25, a Greenback convention was held to protest against it, and adopted three resolutions—(1) that all bank and corporation currency should be withdrawn; (2) that no currency be allowed except government paper 'based on the faith and resources of the nation,' and exchangeable on demand for 3.6 per cent. bonds; (3) that coin should be paid only for interest on the national debt, and for that part of the principal which promised it. Several Democratic conventions indorsed these; but in 1876 the prospect of the hard-money Tilden being the next Presidential candidate, led the party to form an organization

of its own. At a convention at Indianapolis, May 17, they nominated Peter Cooper of New York and Newton Booth of California for President and Vice-President; Booth declined, and Samuel F. Cary of Ohio was substituted. The platform, besides the three points above, demanded the repeal of the Resumption Act. The ticket polled 81,737 votes, over half of them in Michigan, Illinois, Indiana, Iowa, and Kansas. In the State elections the next year the party polled 187,095 votes, but the main strength continued to be in the West. The next year it was absorbed in the Greenback-Labor Party (q.v.).

GREEN'BACKS: bank-notes issued by the U. S. govt. during the war of secession 1861–65; popularly thus named from the green color of many of them. The designation, which came to be loosely used for all U. S. bank-notes, is no longer in frequent use. During the war the immense expenditure of the government led to the issue of an unprecedented number of bank-notes, bonds, and currency papers of various kinds. At first, the manufacture of these notes taxed the resources of the government in a very embarrassing way; and there was ample reason to suspect that forged notes and bonds were abundantly in circulation; but, by degrees, a large establishment was organized at Washington, under the immediate control of the sec. of the treas., where everything was conducted from first to last; rags, fibres, plates of steel, and colors were taken in, and finished notes were sent out. From the civil war onward, the currency of the U. S. consisted mainly neither of gold nor silver, but of the greenbacks, or inconvertible paper money, issued during the civil war, whose value fluctuated greatly. This paper was declared convertible into coin 1879, Jan. 1; and specie payments were then completely resumed. Since then, the paper money, formerly at very great discount, is on a complete par with gold. See BANK—BANKING: CURRENCY: FINANCE: MONEY.

GREEN BAY: part of Lake Michigan, separating Wisconsin from the upper peninsula of Mich.; extending from the n.w. part of the lake 140 m. s.w. into Wis., with average breadth 30 m., depth 500 ft., and surface elevation above sea-level 578 ft. Its name is derived from the beautiful green color of its waters.

GREEN BAY, Wis., city, cap. of Brown co., situated on the bay of the same name at the mouth of Fox river, and on the Chicago & Northwestern, Chicago Milwaukee & St. Paul, and the Green Bay & Western railroads. It is the oldest town in Wisconsin and has a very interesting history. The place was first visited in 1634, by Jean Nicollet, at the instance of Champlain, governor of New France, in an effort to find the mythical short route to China. An Indian village was in existence there at the time, and the French missionaries soon

established themselves at the place, which was subsequently visited by Marquette, Joliet, Allouez, and Tonti. Permanent French settlers came also, and they impressed their characteristics on the place for more than 200 years. It fell into the hands of the English at the close of the Seven Years' War, in 1763, and in 1816 the Americans built a fort on the opposite side of the river, to which they gave the name of Fort Howard. A prosperous town grew up around the fort, but in 1895 it was annexed to Green Bay and is now known as the West-Side. Green Bay does an extensive traffic both on the lakes and by rail, its harbor affording access to the largest lake steamers. The chief export by way of the lakes is grain, the lumber trade having declined of late years in consequence of the exhaustion of the fine forests. There are a number of considerable manufacturing plants, including breweries, paper-mills, a sulphite mill, large saw-mills, planing mills, a large canning factory, shoe factory, glove factory, a factory of dairy products, a furniture factory, woodenware factories, machine shops, a candy and biscuit factory, pickle, carriage, cornice, coffin, paper-box, and other factories. The city does an extensive jobbing and wholesale business, and the fish trade is also an important item. A light and power plant furnishes gas for lighting and heating, and electricity for light and power. Water is obtained from artesian wells by a private company. There are a number of fine public buildings, and the city is unusually well supplied with schools, churches, banks, newspapers, etc. Pop. (1910) 25,236.

GREEN BUSH, New York. See RENSSELAER, N. Y.

GREEN'CASTLE, Indiana, city, cap. of Putnam co., near Eel river, and on the Louisville New Albany & Chicago, the Cleveland Cincinnati Chicago & St. Louis (Big Four), and the Vandalia railroads, about 40 m. w. of Indianapolis. It is the seat of De Pauw Univ. (q.v.), and has a good system of public schools and a public library. The Indiana Female College is also located here. The most important manufactures include lumber, pumps, machinery, iron, nails, lightning-rods, saws, wool, and there are valuable timber tracts and sand and lime-stone deposits in the vicinity. It was settled in 1822 and incorporated in 1849. Pop. (1910) about 4,100.

GREEN COLORS: various shades of green; producible both in oil and in water-colors, also in dyeing. Most of them, however, are made by mixing the various yellow and blue materials in different proportions. The following are the green paints in use:

Arsenical green, or Scheele's green, an arsenite of copper, made by dissolving arsenious acid in a solution of potash, and adding it to a solution of sulphite of copper. A precipitate is formed, which is *Scheele's green*, or *Mitis green*.

Brunswick green.—The best is crude oxychloride of copper, but the kind commonly sold is a mixture of carbonate of copper and chalk, or pipe-clay. One shade of this mixture is sometimes called *Bremen green.*

Chrome green, mixture of Prussian blue and chrome yellow.

Copper green, sometimes a natural product, but generally manufactured; it is the oxide or the carbonate of copper, and is sometimes called *green bice*, or *mountain green.*

Emerald green, an arsenite of copper, prepared by a slightly different process from *Scheele's green.*

Frise or *Friesland green*, made with sulphate of copper and sal ammoniac.

Gellart's or *Gellert's green*, mixture of *cobalt blue*, flowers of zinc, and *chrome yellow.*

Sap green—juice of buckthorn-berries fermented for seven or eight days, after which a little alum is added; and when evaporated to a thick consistency, it is pressed into bladders, and hung up until entirely dry. It is employed chiefly in water-colors.

Schweinfurth green, another form of the arsenite of copper produced by dissolving separately equal parts of acetate of copper and arsenious acid: the solutions are then added together quite hot, and the precipitate formed is the beautiful but highly dangerous pigment. Its great beauty has led to its frequent employment in coloring wall-papers, artificial flowers, and even in some cases, it is to be feared, in coloring sugar-confections.

All of these colors, with the exception of sap green, are dangerously poisonous.

Green, in dying, is always understood to be a mixture of the two colors blue and yellow. The materials are generally mixed first with blue, afterward with yellow, proportioning the intensity of each to the shade of color required.

The Chinese have a vegetable green color called *luh-kao*, or green indigo, but it is exceedingly costly, and is obtainable in only very small quantities.

GREENE, Albert Gorton, American lawyer and poet: b. Providence, R. I., 1802, Feb. 10; d. Cleveland, Ohio, 1868, Jan. 4. Graduated from Brown University 1820, he was admitted to the bar in 1823; in 1832 became clerk of the town and of the municipal court of Providence, and in 1858 judge of the court. From 1867 he was in Cleveland, Ohio. He was at one time president of the Rhode Island Historical Society, was a founder of the Providence Athenæum, began the Harris collection of American verse (now at Brown University), and wrote some well-known poems, such as *Old Grimes* and *The Baron's Last Banquet.*

GREENE, Charles Ezra, American engineer: b. Cambridge, Mass., 1842, Feb. 12; d. Ann Arbor, Mich., 1903, Oct. 17. Graduated from Harvard in 1862 and

from the Massachusetts Institute of Technology in 1868, he was United States assistant engineer in 1870–1, city engineer of Bangor, Maine, in 1871–2, and in 1872 became professor of civil engineering in the University of Michigan. He also practiced as consulting engineer, and in 1876–7 was associate-editor of the *Engineering News*. His writings include: *Graphical Method of Analysis of Bridge Trusses* (1875), *Structural Mechanics* (1897), and other technical works.

GREENE, Christopher, American soldier: b. Warwick, R. I., 1737; d. Westchester County, N. Y., 1781, May 13. He was among the first to take the field on the American side after the engagements at Lexington and Concord. Subsequently, as colonel of a Rhode Island regiment, he participated in the campaign in Canada under Arnold. In 1777, while in command at Fort Mercer at Red Bank, on the Delaware, he sustained an attack from a large force of Hessians under Col. Donop, who were repulsed with great slaughter. For these services a sword was voted him by Congress, and a monument commemorative of the battle and of the valor of the American commander was erected in the neighborhood of Fort Mercer in 1829.

GREENE, Edward Lee, American botanist: b. Hopkinton, R. I., 1843, Aug. 20. After studying at Albion College, Wis., he took orders in the Protestant Episcopal Church (1871); but in 1885 entered the Rom. Cath. Church. He was professor of botany at the Roman Catholic University in Washington 1895–1904 and since 1904 associate in botany at the Smithsonian Institution, and has published *Illustrations of West American Oaks* (1890); *Flora Franciscana* (1891); *Pittonia* (5 vols. 1887–1903); *Plantæ Bakerianæ* (1901); *Leaflets of Botanical Observation* (1903–5); etc.

GREENE, Francis Vinton: an American military officer; b. in Providence, R. I., 1850, June 27; graduated at U. S. Military Academy 1870; assigned to engineer corps: promoted 1st lieut., 1874; cap., 1883; resigned in 1886. Served as assist. astronomer and surveyor of international commission for survey of n. boundary of U. S. 1872–76; military attaché at U. S. legation in St. Petersburg, 1877–79; served with Russian army in Turkish war; professor of practical military engineering at U. S. Military Academy 1885–86; was in volunteer army in the war with Spain (1898); was promoted maj.-gen., 1898, Aug. 13, for services at the capture of Manila. From 1902–4 he was police commissioner of New York city. He has written *The Russian Army and its Campaign against Turkey* (2vols., 1879); *Army Life in Russia* (1881); *The Mississippi Campaigns of the Civil War* (1882); *Life of Nathanael Greene* (1893); etc.

GREENE, George Sears, American civil engineer and soldier: b. Warwick, R. I., 1801, May 6; d. Mor-

ristown, N. J., 1899, Jan. 28. He was graduated at West Point in 1823 and was for several years one of the professors there, but in 1836 adopted civil engineering as a profession, after sending in his resignation as an officer in the United States army. He was engaged subsequently in railway construction in many eastern States, and in 1856 the Croton Aqueduct Department of New York city commissioned him to execute several important works. He designed and constructed the reservoir in Central Park, widened High Bridge, and built a water tower and reservoir at its western extremity. At the beginning of the Civil War he took command of the Sixtieth New York Volunteers, and was put in command of a brigade at Cedar Mountain and a division at Antietam. He took part in many other important events of the war and was severely wounded in an engagement near Chattanooga, in 1863. In 1866 he retired from the army and the following year was appointed commissioner and chief engineer of the Croton Aqueduct Department, and in 1871 was called to Washington, D. C., as chief engineer of public works. During his three years' incumbency of that office he planned the sewer system of the national capital.

GREENE, George Washington, American historian: b. East Greenwich, R. I., 1811, April 8; d. there 1883, Feb. 2. He was a grandson of Gen. Nathanael Greene (q.v.) of Revolutionary fame. After study in Brown University, he traveled extensively in Europe, was United States consul at Rome in 1839–45, and from 1848 until his resignation in 1852 was professor of modern languages at Brown University. He was appointed non-resident professor of history at Cornell in 1872. His publcations include several historical works, such as: *Historical Views of the American Revolution* (1865), *Life of Nathanael Greene* (1867–71), *The German Element in the War of American Independence* (1876), and a *Short History of Rhode Island* (1877).

GREENE, Homer, American author and lawyer: b. Ariel, Pa., 1853, Jan. 10. He was graduated from Union College in 1876, from the Albany Law School in 1878, was admitted to the bar in 1879, and entered practice at Honesdale, Pa. In Pennsylvania politics he has been active as a Republican. He has contributed much verse and prose to the magazines, and published: *The Blind Brother, Burnham Breaker, Coal and the Coal Mines, The Riverpark Rebellion; Whispering Tongues* (1902); *Picket's Gap* (1902); etc.

GREENE, Nathanael: American revolutionary general: 1742, May 27—1786, June 19; b. at Potowhommet, Warwick co., R. I. His father was a leading preacher among the Quakers, and educated his son very simply, training him from childhood to work on his farm, and at his anchor-forge and grist-mill. By perseverance,

however, Greene acquired considerable knowledge of ancient and English history, geometry, law, and moral and political science; he was also fond of reading books on war. In 1770, he was chosen a member of the Rhode Island assembly, and, to the great scandal of his fellow Quakers, was among the first to engage in the military exercises preparatory to resisting the mother-country. In 1774, he enlisted as private, and in 1775 was appointed to the command of the Rhode Island contingent to the army at Boston with the rank of brig.-gen. He was promoted to be maj.-gen. 1775, and distinguished himself at the engagements of Trenton and Princeton. At the battle of Brandywine, he commanded a division, and by his skilful movements saved the American army from utter destruction; and at Germantown he commanded the left wing. In 1778 he accepted the office of quarter-master-general. In 1780, he succeeded Gates (q.v.) in the command of the army of the South. Gates had just been completely defeated by Cornwallis, and Greene found the army in a wretched state, without discipline, clothing, arms, or spirit. By great activity, he put his army into better condition, and remained on the defensive for the remainder of the year. In 1781, he had a successful skirmish with an English detachment, but drawing on himself the whole army of Cornwallis, much his superior in numbers, he made a masterly and successful retreat. With 5,000 new recruits, he entered upon more active operations, and finally defeated the English at Eutaw Springs, the hardest fought field of the revolution, which put an end to the war in S. Carolina. This battle, however, is by some deemed a drawn battle, with such generalship on Gen. Greene's part, and with such losses to the British, as gave the effect of an American victory. Congress struck, and presented to him, a medal in honor of this campaign, and the Carolinas and Georgia made him valuable grants of land. When peace was restored 1783, Greene returned to R. I. where he received numerous testimonials of public admiration. His exact burial place was long in doubt. In 1901 Col. Asa Bird Gardner, acting for the Rhode Island Society of the Cincinnati, found, in a cemetery vault in Savannah, Ga., the plate of the hero's coffin and 3 buttons of his uniform.

GREENE, Nathaniel, American journalist: b. Boscawen, N. H., 1797, May 20; d. Boston, Mass., 1877, Nov. 29. At 12 he entered the office of the *New Hampshire Patriot*, published at Concord, and at 15 became editor of the *Concord Gazette*. After editing papers at Portsmouth, N. H., and Haverhill, Mass., he removed to Boston, where he established a new Democratic paper known as the *Boston Statesman*, and published semi-weekly, its first appearance being in 1821, Feb. 6. During the administration of J. Q. Adams it was opposed to the almost unanimous sentiment of the city and

State; but in 1829, when the general government passed into the hands of the Democratic party, President Jackson appointed Greene postmaster of Boston. He held the office for 12 years without interruption, and, although removed in 1841, was reappointed to it by President Tyler in 1844, and held it until 1849. In 1836 he translated a *History of Italy* from the Italian of Sforzozi, which was followed by the translation of two volumes of *Tales from the German* (1837). In 1843 he published *Tales and Sketches from the French, German, and Italian.*

GREENE, Richard Gleason: an American clergyman and editor; b. in East Haddam, Ct., 1829, June 29; educated at Yale Univ.; graduated at Andover Theo. Sem., 1853; ordained to ministry; held pastorates in Congregational churches in Adrian, Mich., Springfield, Mass., and East Orange, N. J. In 1874 was elected by Massachusetts Legislature to preach the annual sermon before the governor and legislature. Was editor of 3 cyclopedias, 1875–1903; *Library of Universal Knowledge, International Cyclopedia, and Columbian Cyclopedia;* and was author of over 200 reviews of books, besides special articles in periodical literature.

GREENE, Robert: abt. 1560–1592, Sep. 3; b. Norwich: English poet and dramatist. He was placed at St. John's College, Cambridge, and took his degree A.B. 1578. Returning from travel in Spain and Italy, he re-entered the university, and took his degree A.M. at Clare Hall 1583. He appears to have studied also at Oxford 1588. He went to London, where he supported himself by writing plays and romances. He poured out plays, poems, and novels, ruffled about in silks, wore long hair, and haunted taverns and places of questionable resort with such wild geniuses as Marlowe and Peele. He died of the consequences of a debauch, and was buried next day in the New Church-yard, near Bedlam. In 1580 he wrote his first novel, *Mamilia*, but it was not published until 1583. By 1590 he had written *Penelope's Web; Euphures, his Censure to Philautus; Aleida; Greene's Metamorphosis; Perimedes the Blacksmith; Opharison; Pandosto; The Spanish Masquerado; Menaphon;* and *Tullies Love.* In 1590 appeared *Mourning Garment* and *Never too Late;* in 1591 *Farewell to Follie;* and in 1592 *A Quip for an Upstart Courtier*, a satire on the social evils of the times. Greene's first play was probably *Alphonsus*, written about 1591; the second was *Looking Glass for London and England;* and in quick succession followed *Orlando Furioso, Friar Baeon* and *Friar Bungay*, and *James IV. of Scotland.* On his death-bed he wrote or completed his *Groatsworth of Wit Bought with a Million of Repentance*, and *The Repentance of Robert Greene*, which were published shortly after his death. Greene is an important figure in the history of the English novel, drama, and lyric. His fame chiefly rests on the lyrics in the romances: his dramas, except *Friar Baeon* and *James IV.* are unimportant.

GREENE, Samuel Dana: American naval commander; b. Cumberland, Md., 1840, Feb. 11; d. Portsmouth, N. H., 1884, Dec. 11. He was graduated at the Naval Academy in 1859, and having participated in active service during the first years of the Civil War, he volunteered in Jan., 1862, to serve as executive officer of the *Monitor*, whose capabilities were then untested; and during the engagement of that vessel with the Confederate ram *Merrimac*, in Hampton Roads, he commanded the vessel in consequence of an accident to his superior, Capt. Worden. After the war he was a professor at the Naval Academy for 10 years.

GREENFIELD, *grēn'fēld:* Mass., town, cap. of Franklin co., on the Connecticut river and the Boston & Maine r.r., about 34 m. n. of Springfield. It was once a part of Deerfield, but was separated from the latter in 1743. There are several famous historic associations in the vicinity, and a monument marks the spot where an Indian struck down Mrs. Eunice Williams, wife of Rev. John Williams, in 1704, Feb. 29. This was on the occasion of the massacre at Deerfield (q.v.), and the unfortunate victim was among the 112 captives whom the savages had started on a long march of 300 miles to Canada. Her enfeebled condition indicated that she would not be able to endure the fatigue of the journey, and the savage tomahawked her in order that she might not be a burden to his people. Capt. Turner was killed fighting the Indians in the Greenfield meadows; and Agrippa Wells a blacksmith, who became a captain in the patriot army during the Revolution, was a native of the place. During Shay's Rebellion (q.v.), a body of insurrectionary troops was quartered there. In 1903 the town celebrated its 150th anniversary. The chief manufactures are machinery, cutlery, shoes, paper, woodenware, boxes, bricks, toys, children's carriages, silverware, agricultural implements, etc. Pop (1900) 7,927; (1910) 10,427.

GREEN'FINCH (*Cocothraustes chloris*): bird of the family *Fringillidæ*, common in most parts of Britain, frequenting gardens, orchards, shrubberies, small plantations, tall hedges, and cultivated lands; called often *Green Linnet*, sometimes *Green Grosbeak*. It is found even in Scandinavia, but is more common in s. Europe; its range extends throughout Asia to the Pacific Ocean, and w. as far as Madeira. No species is found in America. The bill is much thicker than that of the true linnets, to which it is nearly allied. A prevailing green tint, mingling with gray and brown, characterizes the plumage.

GREEN'GAGE: variety of plum of green color and roundish shape, the *Reine Claude* of the French; generally esteemed one of the finest varieties in cultivation, perhaps superior to all others. It is not of the largest size, but in delicacy and richness of flavor it is unsurpassed.

GREEN'HEART, or BEBEERU, *bē-bē'rú* (*Nectandra Rodiæi*): tree of nat. ord. *Lauraceæ*, native of Guiana, of great value as a timber-tree, also yielding a valuable medicinal bark. The timber is commonly called *Greenheart;* the bark is better known as *Bebeeru* (otherwise *Beebeeru, Bibiru, Bibiri,* etc., and *Sipiri* or *Sipeira*), and the alkaloid to which chiefly it owes its properties is called *Bebeerine* (q.v.). The tree grows mostly in British Guiana, and in the greatest perfection on the low hills behind the alluvial lands; it rises with erect, slightly tapering trunk 40 or 50 ft. without a branch, attaining a height of 80 or 90 ft. in all, and a diameter of 3 or even 4 ft. The wood is extremely strong and hard, and is exported for the same uses as lignum-vitæ, which it much resembles. It takes a high polish. It is so heavy as to sink in water. It is remarkable for durability, and for being almost exempt from the attacks of white ants on land, and of the teredo in water. It is used in Guiana for ship-building, and for all the most important purposes for which timber is required.—The bark is hard, heavy, and brittle, with a fracture resembling that of sandstone, has a white epidermis, and is of a bright cinnamon color within. It has a very bitter, somewhat astringent taste. Its tonic and febrifugal properties resemble those of cinchona bark. Instead of the bark itself, the sulphate of bebeerine is generally used in medicine.

S. America produces a number of species of *Nectandra*. *N. Puchury* yields the seeds called *Pitchurim Beans,* which are astringent, are regarded as febrifugal, and are prescribed in dysentary, diarrhea, etc., and the oil of which is used as a substitute for chocolate.

GREENHOUSE: a building in which exotic plants are grown or the development of hardy plants is hastened; formerly devoted to the cultivation of flowers and tender fruits, but now extensively used in market-gardening operations. Both the cold frame and the hot bed are rude forms of the G. with different methods of heating. The G. is designed to furnish only a mild temperature, not exceeding 65° F. by day, and running 20° lower at night. Buildings in which a higher temperature is required are properly designated hot-houses.

Until recently the ordinary form of a G. was long and narrow. By the improved method now adopted, the width is 20 or 22 ft., instead of 10 or 11 ft. The walls are best made of inch boards, which should be covered with tarred paper and weather-boarded. This form is cheaper and better than brick walls, or walls with a dead air space. The roof is of glass, each sash about six by three ft , with every other one hinged so that one end can be raised to admit air. Heat is supplied by warm air conducted over the building by flues from a furnace, or by hot water circulating through pipes from a boiler. The glass roof furnishes an abundance of light and prevents the escape of heat. The plants are kept either in pots, or in the case of large ones in tubs, or are grown on benches or tables covered with soil to the depth of six to ten inches. The plants will require frequent and liberal watering and constant care to

guard against insect enemies. The temperature must be closely watched, and in the general management of the G. both vigilance and skill will be required. The cost of a G., including heating and ventilating apparatus, should not exceed $5 per running foot if flues are used, or $10 if hot water is employed. In many localities the cost will be much below these figures.

GREEN ISLAND: village in Albany co., N. Y.; on an island in the Hudson river between Troy and W. Troy, 6 m. above Albany. It is connected by bridges with Troy and W. Troy, and by street railroads with Troy and Cohoes, and contains 5 churches, car, stove, sash, and blind factories, iron foundries, machine-shops, marble works, etc. Pop. (1910) 4,737.

GREEN'LAND: region, probably an island, of unknown extent northward, stretching from its s. extremity, Cape Farewell (q.v.), along the Atlantic and Arctic oceans on the e., and Davis' Strait, Baffin's Bay, and Smith's Sound on the w. The w. coast pursues a n.n.w direction as far as Cape Alexander, 78° 10′ n. lat.; it then has a general n.e. direction, gradually changing to e. beyond 82° 30′. Its n. limit is now supposed to be the rocky ice-clad shore of the Polar sea, abt. 83° n. lat. Lieut. Beaumont of the British Arctic Expedition, 1875–76, followed the line of the coast with a sledge party to 82° 54′ n. lat., and 48° 33′ w. long., when the land was beginning to trend southward. It is thus almost proved that G. is entirely distinct from the land on the w. side of Smith's Sound—that in fact G. is an island. Previously our knowledge of the w. coast was derived chiefly from Dr. Kane, who had assigned Cape Alexander, abt. 78° 10′ n. lat., as its termination. G. is said to have been discovered about the close of the 9th c. by an Icelander named Gunbiörn, who named it Hvidsaerk (White Shirt), from its snowy headlands. It obtained the name of G. from another Icelander, Eric Rauöi (The Red), who led hither an expedition in 985 or 6, and founded two settlements on the w. coast, called Oestre and Westre Bygd e. and w. colonies. About four centuries afterward the Westre Bygd was destroyed by the pestilence called the 'black death' combined with the attacks of the aborigines; and a century after this, the Oestre Bygd suffered the same fate. G. was visited, and its w. coast explored, successively by Frobisher, Davis, and Baffin, the latter having reached lat. 78° n. (the limit of the inhabited country). Kane touched 82° 30′; Greely (1883) 83° 24′. The e. and s. coasts appear to be so beset with ice as to be practically inaccessible. The former was explored by Scoresby to 74° 30′ n., and two deep inlets were discovered. This coast-land is called by the inhabitants of the other districts Lost Greenland. The interior, a continuous ice-cap, had baffled explorers until Nansen (q v.) made his excursion across it from the e. to the w. coast 1888–9: see his *Across Greenland* (1890). The great extent of land toward the pole makes the climate colder than in corresponding latitudes further e.—so much so, that in

Lapland, lat. 72° n., the temperature is as high as in G., lat. 60° n. From observations made by Dr. Kane, 1853, Sep. —1855, Apr., in lat. 78° 37′ n., long. 70° 40′ w., the average temperature throughout the year is — 3·22 ; from Oct. to Apr. inclusive — 23·43°; from May to Sep. inclusive, + 25·07°. The greatest degree of cold was — 68° in Feb., and the greatest heat was + 53·9 in July, the only month in which the average temperature was above freezing-point. During the short summer, which in few places exceeds four months (during two of which, June and July, the sun is always above the horizon), vegetation is very rapid, the plants being for the most part the same as these indigenous to n. Scotland, but dwarfed, the tallest trees not exceeding 18 ft. The inclemency of these regions does not affect the animal kingdom (man excepted). The walrus, seal, polar bear, arctic fox, dog, and reindeer abound, and supply the inhabitants with almost all necessaries of life. Black cattle and sheep have been introduced by the missionaries. The sea swarms with different species of cetacea, such as the rorqual, mysticetus, narwhal, porpoise, etc., and of fish, as the cod, salmon, and herring. Sea-fowl are very abundant during the summer; guillemots, sandpipers, plovers, and grouse also are found. The only mineral found in sufficient quantity for exportation is Cryolite (q.v.), which is found at Arksut, and is largely exported. Near the same place are found veins of tin associated with ores of lead, copper, zinc, iron, molybdenum, and with cryolite, fluor-spar, zircon, and other minerals. Copper-ore is said to be abundant in various parts; and gadolinite, sodalite, tourmaline, with garnets, iolite, rock-crystal, etc., are frequent. Good coal is abundant on the island of Disco.

The first settlement was made 1721 by Hans Egede (q.v.) a Norwegian clergyman at Godthaab, who, with 43 colonists, planted a missionary station in this bleak region. This mission, supported by the Danish govt., now has 8 missionary stations; and the Moravians have 5; from Julianehaab, the most southern, to Uppernavik, at the very verge of human existence. In 1874, May, the first native pastor was ordained. The people depend chiefly on the fisheries—the same which have so long attracted so many vessels from Great Britain. The exports are whale and seal oil, and cryolite; the skins of the seal, reindeer, and fox, and eider-down. The imports are wheat, brandy, coffee, sugar, tobacco, and firewood. About 10,000 or 12,000 tons of cryolite are annually exported, half to Denmark and half to the United States. The trade to G. has always been a monopoly in the hands of the Danish government. Each settlement is managed by a trader and his assistant, who are paid by government; and all controlled by a board at Copenhagen. The govt. is administered with economy and justice, and strictly for the good of the people. The people are a simple folk, lacking the vices of a luxurious civilization. Nearly the whole pop. is on the w. coast. The whale fisheries are carried on by the settlers and are for the behoof of the Danish crown. There are

now 13 different Danish colonies, comprising abt. 60 trading settlements, along abt. a thousand m. of the w. coast of Greenland—7 in North Greenland (n. of lat. 67° n.), and 6 in South Greenland. At these settlements are collected the products from 176 inhabited places. Pop. (1901) 11,895.

GREENLAND WHALE, or BOWHEAD: the largest and most restricted of the 'right' or whalebone whales of the genus *Balæna* (*B. mysticetus*). It grows occasionally to a length of 70 feet, but is usually considerably less; and is black, except a white patch on the under side of the jaw. This whale may yield 275 barrels of oil, and 3,000 pounds of whalebone. It has become comparatively rare through constant pursuit.

GREENLEAF, SIMON, American jurist: b. Newburyport, Mass., 1783, Dec. 5; d. Cambridge, Mass., 1853, Oct. 6. He commenced the practice of law in 1806 at Standish, afterward practising at Gray and Portland. He was a reporter of the Supreme Court 1820–32; professor of law at Harvard University 1833–48, succeeding Judge Story in the Dean professorship in 1846; and upon his resignation in 1848 was made professor emeritus. Beside nine volumes of reports of the Maine Supreme Court proceedings he published: *Treatise on the Law of Evidence* (1842–53); *Principles of Freemasonry* (1820); *Examination of the Testimony of the Four Evangelists by the Rules of Evidence, as administered in Courts of Justice, with an Account of the Trial of Jesus* (1846). He also edited Cruise's *Digest of the Laws of England respecting Real Property* (1849).

GREENLINGS: a family (*Hexagrammidæ*) of coast-fishes allied to the rose-fishes, many species of which occur abundantly from northern California to Bering Sea, including several excellent and of local importance as food-fishes. They are brilliant in color, yellow and green being prominent; are carnivorous; and seek their food among kelp and about rocks.

GREEN MOUNTAIN BOYS: association of Vt. men formed in the early part of the revolutionary war for the purpose of seizing Ticonderoga and Crown Point, on Lake Champlain, and the British cannon and military stores there. They numbered 270 and were commanded by Ethan Allen. When they were near the head of Lake Champlain on their march to Ticonderoga, they were met by Benedict Arnold, who as col. in the army demanded the command. Allen refused to give way and his men refused to proceed under any other officer, whereupon Arnold agreed to accompany the expedition as a volunteer. At daybreak 1775, May 10, Allen and Arnold with 83 men crossed the river at Shoreham, opposite Ticonderoga, rushed up the hill to the fort, secured the sentries, and while Allen aroused Capt. Delaplace, the commander, and demanded his immediate surrender, his men captured the entire garrison. Two

days afterward Seth Warner, Allen's lieut., took Crown Point. With the subsequent capture of St. John's on the Sorel, the Green Mountain Boys secured a total of 60 prisoners, 200 cannon, and a large supply of gunpowder.

GREEN MOUNTAINS: portion of the Appalachian range (q.v.), covering nearly all of Vermont. The Green Mountain range begins at West Rock, near New Haven, Conn., passes through the w. parts of Conn. and Mass., takes a middle course in Vt. between Lake Champlain and the Conn. river, and extends to the borders of Canada, between which and the Gulf of St. Lawrence it is known as Notre Dame Hills. The highest points are Mt. Mansfield, 20 m. n.w. of Montpelier, 4,279 ft. above sea-level; Camel's Hump, 17 m. w. of Montpelier, 4,188 ft.; Killington Peak, near Rutland, 3,924 ft.; and Ascutney, in Windsor co., near the Conn. river, 3,320 ft. The part in Mass. is locally known as the Hoosac Mountains, and that along the N. Y. line as the Taconic Mountains. Large quantities of marble, iron, and slate, and some of copper and gold are found in the range; and the entire section is rich in timber and grasses.

GREENOCK, *grēn'ok:* parliamentary burgh, market-town, and important seaport of Scotland, county of Renfrew, on the s. bank of the Firth of Clyde, on a narrow strip of shore, and on the slopes of the hills which form its background, 22 m. w.n.w. of Glasgow. It extends more than two m. along the shore, and at one place climbs to a considerable elevation up the face of the hills, which here rapidly rise to 800 ft. The most important buildings are the custom-house, the exchange, the Watt monument containing a statue of Watt by Chantrey, a museum, a lecture-room, and a library, the Mechanics' Institute, etc. The harbors of Greenock are on a large scale; the Albert was constructed 1866; and from it extends westward the fine Princes pier, opened 1870. Its quays can be approached by steamers, and its harbors entered by vessels at any tide. The trade is mainly in sugar-refining, for which it has 18 establishments, from some of which about 1,000 tons of refined sugar are turned out in one week. In ship-building, about 20 iron vessels are turned off the stocks annually. There are, besides, manufactures of steam-engines, chain-cables, anchors; and rope and sail making. It sends one member to parliament. Pop. (1901) 67,-645.

GREENOCKITE, n. *grēn'ŏk-īt,* or CADMIUM BLENDE, a native sulphid of cadmium, having the formula CdS, and crystallizing in hemimorphic forms belonging to the hexagonal system. It is transparent, or nearly so, and yellow, with a vitreous or resinous lustre. It turns carmine when heated in a closed tube, returning to its original color upon cooling; and it dissolves in hy-

drochloric acid, with liberation of sulphuretted hydrogen. Greenockite is brittle, and has a hardness of from 3 to 3.5, and a specific gravity of about 5.0. In the United States it is found in Marion County, Ark., in the zinc-bearing districts of southwestern Missouri, and in a zinc mine in Lehigh County, Pa.

GREENOUGH, *grēn'ō*, HORATIO: 1805, Sep. 6—1852, Dec. 18; b. Boston: sculptor. He received a public and private school education, and took a partial course at Harvard College, but his all-absorbing interest in art led him to withdraw before graduation and go to Florence and Rome for technical study. Before leaving Harvard he made the design from which Bunker Hill monument was constructed. He reached Rome 1825, and excepting brief trips to Paris and Boston made his permanent residence there. In 1851 he went to Washington to erect a historical group, *The Rescue*, ordered by congress. His works include a bust of Lafayette (1826); colossal statue of Washington, ordered by congress and now in front of the national capitol (1843); marble busts of John Adams, John Quincy Adams, John Jacob Astor, James Fenimore Cooper, Henry Clay, John Marshall, and Josiah Quincy; and ideals, bust of *Christ*, *Medora*, *Venus*, *Victrix*, the *Angel Abdiel*, *Chanting Cherubs*, *Lucifer*. and *The Graces*.

GREENOUGH, JAMES BRADSTREET: American Latin scholar: b. Portland, Me., 1833; d. Cambridge, Mass., 1901, Oct. 11. He was graduated from Harvard College in 1856, for some time practised law in Michigan, in 1865 was appointed tutor in Latin at Harvard, in 1874 assistant professor of Latin, and in 1883 professor. In 1872 he began at Harvard a course in Sanskrit and comparative philology, and until 1880, when a chair of Sanskrit was founded, gave instruction in those subjects. He became widely known through a series of Latin textbooks, particularly a *Latin Grammar*, prepared in collaboration with J. H. Allen; and wrote also a *Special Vocabulary to Virgil*, and, with G. L. Kittredge, *Words and Their Ways in English Speech* (1901).

GREENOUGH, RICHARD SALTONSTALL: sculptor: b. Jamaica Plain, Mass., 1819, Apr. 27; d. Rome, Italy, 1904, Apr. 23. He was educated in the Boston Latin School, studied drawing and sculpture with Clavenger, went to Florence to work with his brother, studied in Venice, Ferrara, Bologna, and Florence, 1840–41, and was compelled by ill health to return to Boston. His works include a head of Christ, *Moses and the Daughter of Pharoah*, *Cupid Warming an Icicle*, *Night Watching a Young Mother*, bronze group *The Shepherd Boy and the Eagle* (Boston Athenæum), bronze statue of Franklin (in School street, Boston), marble statue of Gov. Winthrop (Mt. Auburn Cemetery), *Victory* (memorial to the dead of the civil war, Boston Latin School),

and colossal statue of Gov. Winthrop (in Statuary Hall, national capitol).

GREENOUGH, Sarah Dana Loring: American author: b. Boston, 1827, Feb. 19; d. Franzensbad, Austria, 1885, Aug. 9. Her works include: *Treason at Home*, a novel (1865); *Arabesques* (1871); *In Extremis, a Story of a Broken Law* (1872); and *Mary Magdalen*, a poem (1880).

GREENPORT, *grēn'pōrt:* village, port of entry, Suffolk co., N. Y.; on Shelter Island Sound, between Peconic and Gardiner's bays; 95 m. e. by n. of Brooklyn; e. terminus of the Long Island railroad. It contains several churches, 2 national banks, several hotels and boarding-houses, graded and primary schools, and weekly newspapers, shipyards; marine railways, a stereotype foundry, and manufactories of flower-pots, wire goods, etc. It has a spacious and completely land-locked harbor, carries on a large coasting and fishing business, is a favorite summer resort. Pop. (1910) 3,089.

GREEN RIV'ER: river, tributary of the Ohio, rising near the centre of Ky., and flowing through that state; first westward for about 150 m., passing the Mammoth cave; then n.w. for the remainder of its course. It joins the Ohio 9 m. above Evansville, Ind.; and at its mouth is about 600 ft. in breadth. It is more than 300 m. in length, navigable for small steamers 200 m. The lower course of the Green River is through a country abounding in coal. The name Green River is applied to several other streams, mostly small—two in western Mass., one an affluent of the Deerfield and Connecticut; and the other, of the Housatonic.

GREEN RIVER: one of the constituents of the Rio Colorado of the West. It rises in the Rocky Mountains, near Fremont's Peak, in the w. part of Wyo. Terr.; flows s., then s.e. through the n.c. corner of Utah, and into the n.w. corner of Colo., turns s.w. and again enters Utah, and flows thence s. till it joins the Grand river, the other constituent. Its entire length is estimated at 500–700 m., of which nearly half is in Utah. It traverses a mountainous country, passes through the Uintah Mountains at Flaming Gorge, just below which the walls of the cañon are nearly 1,500 ft. high, has a swift current and numerous rapids and cataracts, but has no importance for navigation.

GREENS: a term applied somewhat indiscriminately to the leaves of various plants used for food. Among those largely cultivated may be named Collards (grown principally at the South), kale, mustard, spinach, and Swiss chard. Of plants growing wild the cowslip and dandelion are extensively used for greens. In cultivation of greens it is essential to secure rapid and uninterrupted growth if a good quality is to be secured. The ground must be rich and the surface soil very finely pulverized. During the whole period of growth, weeds must be

entirely excluded. Collards and kale are closely allied to the cabbage, and require somewhat similar treatment. Mustard is grown in drills. A sowing should be made every fortnight in order to secure a succession of tender leaves. Spinach is sown early in the fall for spring use, the plants being covered in winter and in early spring to provide a supply for the summer. Swiss chard is cultivated like beet, of which it is an ornamental variety.

GREEN'SAND: the name given to two divisions of the Cretaceous System (q.v.). They are so called from the occurrence in some of their beds of numerous small green specks of silicate of iron, sometimes so abundant as to give a green color to them. The term is, however, far from being descriptive of the various included strata; it must be considered simply as a name. In some districts, especially on the continent, the green particles are entirely absent from the strata. On this account it has been proposed that the Lower Greensand should be called Neocomian, because strata of this period are well-developed at Neufchatel (Neocomum), in Switzerland. The mineral structure or lithological character of the Upper Greensand is so like that of the Lower, that it is scarcely possible to separate them when the intermediate gault is absent, except by their organic remains, which are very distinct; so much so, indeed, as to have caused the placing of the one series in the Lower Cretaceous group, and the other in the Upper. It should also be noticed that the relative importance of the two divisions is very different; the Lower Greensand includes a series of strata that are of a value nearly equal to the whole Upper Cretaceous group, of which the Upper Greensand is but a subordinate member.

The *Upper Greensand* consists of beds of sand, generally of a green color, with beds and concretionary masses of calcareous grit, called firestone. The strata on the cliffs of the Isle of Wight are 100 feet in thickness. This formation is supposed to have been a littoral deposit on the shores of the Cretaceous seas. While the chalk was being deposited out at sea, these sands were being laid down along the shore, contemporaneous with the chalk, although they appear inferior to it. Their position would necessarily result from the Cretaceous sea widening its area, and as the shore submerged, the greensand would be covered with the chalk, and would appear as an older and underlying deposit. The beds of this period are rich in fossils, abounding especially in the remains of sponges, mollusca, and echinodermata.

The *Lower Greensand* consists of a large series of more or less indurated sandstones and clays, with occasional calcareous beds. They attain a thickness of 850 feet. The sands preponderate in the upper, and the clays in the lower portion of the formation. Some beds of clay, sometimes as much as 60 feet thick, are used as

fuller's earth. The calcareous stone is a highly fossiliferous band of limestone locally called Kentish rag, much used for building in Kent and Sussex. The formation was formerly known as the iron sand, because of the sands being cemented together by an abundance of oxide of iron; this gives them a reddish color. The Lower Greensand contains numerous fossil mollusca and other marine remains.

GREENSBORO, *grēnz'bŭr-rŭh:* town and cap. of Hale co., Ala.; 50 m. n.w. of Selma, 38 m. s. of Tuscaloosa: on the Selma Marion and Memphis railroad. It is in a rich cotton region and a little n. of the famous canebrake region of ante-bellum days, and contains the Southern Univ., under the auspices of the Ala. conference of the Meth. Episc. Church (founded 1850, and possessing a large library), a female college, normal school, several churches, banks, and a weekly newspaper. Pop. (1870) 1,760; (1880) 1,833; (1890) 1,759; (1900) 2,416; (1910 est.) 2,490.

GREENSBORO: city and cap. of Guilford co., N. C.; on Richmond and Danville and Cape Fear and Yadkin Valley railroads; 48 m. s.s.w. of Danville. It is in a tobacco, wheat, corn, oats, and fruit region; is the seat of Greensboro Female College for white girls, Bennett College for colored youth of both sexes, Guilford College, and the State Agricultural and Mechanical College for colored students; contains gold, copper, and iron mines; has blast furnaces for the manufacture of Bessemer steel; roller, flour, planing, hosiery, and cotton mills, brick, tile, and terra cotta works, foundries and machine shops, etc. The city was named in honor of Gen. Greene, who commanded the Continental army in the battle of Guilford courthouse, fought 5 m. n.w. of Greensboro, 1781, March 15. Pop. (1910) 15,895.

GREENSBURG, a borough and cap. of Westmoreland co., Pa.; on Penn. r.r.; 31 m. e.s.e. of Pittsburg. It is in a coal mining, coking, and natural gas region; has 3 nat. banks, steel works, glass works, steam heating apparatus factory, nut and bolt works, an assessed property valuation of over $4,000,000. Pop. (1890) 4,202; (1900) 6,508; (1910) 13,012.

GREEN'SHANK (*Totanus glottis*): bird of the same genus with the redshank and some of those known as sandpipers, but differing from them in the stronger and slightly recurved bill. It is about the size of a woodcock, but has much longer legs. The bill is about two inches long. The tail is short. The lower part of the tibiæ is naked. The plumage is mostly dusky brown on the upper parts, the feathers edged with yellowish white; the under parts are white. Small flocks of this bird are seen on the British coasts in the winter months, and sometimes near inland lakes and marshes. A few remain to breed in the Hebrides and n. Scotland, but the greater number repair to more northern regions. The geographic distribution is wide even for a bird of passage; from

the arctic parts of Europe, Asia, and (so it is asserted) of America, it extends southward as far as Java and Jamaica. In N. America, the corresponding and very similar species are T. *semipalmatus* and T. *melanoleucus*, known as Willets, Telltales, or Tattlers.

GREEN SNAKE: long, slender snake, common in many parts of the United States. It frequents grassy places, and is quite harmless.

GREEN'STONE: variety of trap rock (q.v.), composed of felspar and hornblende, and having generally a greenish color. It has a more or less compact structure—the component crystals in one specimen being scarcely discernible with a pocket-lens, while in another they form a coarse aggregate; and specimens are found exhibiting all the intermediate stages. In the finest they are not so small and compact as in basalt. Its crystalline structure separates G. equally from the earthy tuffs and the glassy pitchstones. It may become porphyritic from a portion of the felspar forming into larger distinct crystals. In weathering, the disintegrating G. assumes a dark-brown color, and exfoliates round limited centres, giving the rock an appearance as if it were composed of a number of large boulders.

GREENVILLE: city, cap. of Butler co., Ala; on the Louisville and Nashville r.r., 45 m. s. of Montgomery. The chief industries are in cotton and timber; there are shingle factories, saw-mills, and boot and shoe factories. The South Alabama Female Institute is situated here, and there is a thriving college. G. has good waterworks and street railways. Pop. (1890) 2,806; (1900) (1910 est.) 3,500.

GREENVILLE: city, cap. of Washington co., Miss.; on the Mississippi river, and the Richmond and Danville and the Yazoo and Miss. Valley railroads; 100 m. n.n.w. of Jackson. G. is the centre of a large cotton trade; has 2 compresses, oil-mills, saw and planing mills, weekly newspapers, excellent public schools, a fine court-house, etc. Pop. (1880) 2,191; (1890) 6,658; (1900) 7,642; (1910) 9,610.

GREENVILLE: Ohio, city, cap. of Darke co., on Greenville Creek, and on the Cleveland Cincinnati Chicago & St. Louis, the Pittsburg Cincinnati Chicago & St. Louis, and other railroads, 35 m. n. of Dayton. It is built on the site of an Indian village, which was the home, from 1805 to 1809, of Tecumseh and his brother the Prophet. It is noted also as the place of the treaty between General Anthony Wayne and the Indians, in 1795, Aug. 3, after the battle of Fallen Timbers of the previous year, Wayne and his army having spent the winter in the village. The city owns and operates the waterworks, and it has a foundry and machine-shops, lumber mills, fence works, etc.; there is a Carnegie library, a fine court-house, etc. Pop. (1910) 6,237.

GREENVILLE, Pa.: borough in Mercer co., on the Shenango river, and the Erie, the Pennsylvania, and the

Pittsburg, B. & L. E. railroads, about 52 m. s.e. of Erie. Its chief industries are flour-mills, woolen mills, saw- and planing-mills, foundries, machine-shops, railroad shops, carriage and wagon works, tube-mills, machinery for oil-wells, coal-mining, etc. Its schools, churches, and other public institutions are numerous and of a high class. Pop. (1900) 4,814.

GREENVILLE, S. C.: city, cap. of Greenville co., on the Columbia & G., the Southern, and the Atlantic Coast Line railroads, 153 m. n.w. of Columbia. It is a noted educational center, having in its midst the Furman Univ. (Baptist), Chicora Female College (Presbyterian), Greenville Female College (Baptist), Greenville College for Women, a military institute, and a business college. Among its industries are cotton mills, carriage and wagon works, iron works, and flour-mills. The town was settled in 1784, and incorporated in 1831. Pop. (1900) 11,860.

GREENVILLE: Texas, city, cap. of Hunt co., on the St. Louis Southwestern, the Texas Midland, and the Missouri Kansas & Texas railroads, 51 m. n.e. of Dallas. It was settled in 1844 and incorporated in 1875. Cotton and live-stock constitute the chief industries, and it has cotton compresses, cottonseed-oil mills, flour-mills, machine shops, stock-yards, brick-yards, etc. It is the seat of Burleson College, under the auspices of the Baptist Church, and of Holiness College. The electric light plant is owned and operated by the city, and the executive authority is vested in a mayor and council, who are elected biennially. Pop. (1900) 6,860.

GREENWICH, *grĕn'wĭch:* Conn., town in Fairfield co., on Long Island Sound, and the New York New Haven & Hartford railroad, about 28 m. n.e. of New York City. It is charmingly situated, overlooking Indian Harbor, and has many handsome residences with large green lawns, while ancient elms and other graceful trees add a sylvan beauty to the place. It was settled about 1640, and ten years later was designated by the Dutch and English colonists as the boundary line between Connecticut and the Dutch possessions. In the eastern part of the town is the famous ledge of precipitous rocks down which General Israel Putnam rode his horse when pursued by British cavalrymen in 1779, and a granite monument and tablet, erected by the Daughters of the American Revolution, commemorate the event; but every vestige of the old church which stood nearby at the time has disappeared. In order to preserve the charm of its country life, the city has retained the old form of town-meeting government, except in the central portions, where a borough government, consisting of a warden and six burgesses, has charge of affairs. It is the seat of Greenwich Academy, Brunswick School, and Rosemary Hall, and Miss Ely's school for young ladies has recently been removed there from New York City. Pop. (1905) about 12,500.

GREENWICH, *grĭn'ĭj:* parliamentary borough of England, county of Kent, on the right bank of the Thames, 5 m. s.e. of London. It stands partly on an acclivity, but mostly on low marshy ground, portions of which are said to be below the level of the Thames. The older streets are in general narrow and irregular, but those more recently built are spacious and handsome. By far the most interesting institution in Greenwich is the hospital: see GREENWICH HOSPITAL. Among important buildings are the Norfolk College, which supports 22 poor inmates and a warden, and of which the Mercer's Company are the trustees; and the Royal Observatory (see OBSERVATORY) in the midst of Greenwich Park, a finely-kept public ground of nearly 200 acres. Greenwich abounds in taverns, and is always a favorite resort of Londoners, but especially so in the 'whitebait' season—April to August. The town contains extensive engineering establishments, iron steamboat-yards, rope-works, and several factories. Greenwich is connected with London by railway, and is a landing-place for all river steamers. Pop. (1901) 95,757.

GREENWOOD LAKE: popular summer resort, in Orange co., N. Y.; and Passaic co., N. J.; 9 m. long, average width 1¼ m.; 80–90 ft. deep; 8 m. s.w. of Chester, 50 m. n.w. of New York: on the Greenwood Lake division of the Erie railroad. It is nearly surrounded by wild forests, and has parallel ranges of hills rising abruptly from its shores, known on the e. as the Ringwood and Sterling Mountains and on the w. as the Warwick Mountains. Hotels and summer residences have sprung up around the lake. Greenwood Lake was a small pond 1762 when the London Company built a dam and threw the water back upon the lowlands; and it attained its present size when the Morris and Essex Canal Company by means of a large dam flooded thousands of acres 1836.

GREER, DAVID HUMMELL, D.D., American clergyman: b. Wheeling, W. Va., 1844, March 20. He was graduated from Washington College, Washington, Pa., in 1862, and studied theology in the Episcopal Seminary at Gambier, Ohio. From Brown University and Kenyon College he received the titles of Doctor of Divinity and Doctor of Laws. His first ministry was at Covington, Ky.; from there he was transferred to Clarksburg, W. Va., and in 1871 he was called to Grace Church, Providence, R. I. In 1885, Dr. Greer became rector of St. Bartholomew's Parish, the most fashionable and richest of New York Episcopal parishes. In 1890 he established the St. Bartholomew's Parish House, at 42d street and 3d avenue, at a cost of $400,000, built largely through the liberality of Cornelius Vanderbilt. This parish house embraces a wide field of charitable, missionary and educational work. In 1903 Dr. Greer was elected coadjutor to Bishop Potter of the New York Episcopal diocese. He had previously declined three bishopries,

that of coadjutor-bishop of Rhode Island, bishop of Pennsylvania, and bishop of Massachusetts to succeed Phillips Brooks.

GREER, James Augustin, American rear-admiral: b. Cincinnati, Ohio, 1833, Feb. 28; d. Washington, D. C., 1904, June 17. Entering the navy in 1848, he was promoted lieutenant in 1855, and was on board the San Jacinto when that vessel intercepted the English steamer Trent, on which were Mason and Slidell, the Confederate commissioners. He commanded the iron-clad Benton in the fleet that passed the Vicksburg batteries; and in 1873 was in command of the Tigress in its search of the polar seas for the Polaris. He became rear-admiral in 1892 and was retired in 1895.

GREET, v. *grēt* [Dut. *groeten;* O.H.G. *grozjan,* to salute: W. *gresaw,* to welcome]: to salute in kindness and respect; to congratulate; to meet and salute; in *OE.,* to address in whatever manner. Greet'ing, imp.: N. a salutation; expression of kindness or joy. Greet'ed, pp. Greet'er, n. one who.—Syn. of 'greet': to salute; hail; accost; address; compliment.

GREET, or Greit, n. *grēt* [AS. *grætan;* Icel. *grata;* Goth. *gretan,* to weep]: in *Scot.,* to weep; to shed tears. Greetin', a. *grēt'ĭn,* shedding tears. Greetin'-fow, or -fou, *-fô,* that state of partial intoxication which produces a maudlin sentimentality—usually to the shedding of tears.

GREFFIER, n. *grĕf'fĭ-ėr* [F. from mid. L. *graphĭārĭŭs:* Gr. *graphō,* I write]: a registrar or recorder.

GREG, William Rathbone: 1809–1881, Nov. 15; b. Manchester, England: author of several works in literature and politics. He became a commissioner of customs 1856, and acted as controller of her majesty's stationery office 1864–77. He had a conspicuous power of incisive writing, and was interested in philanthropic measures. In his *Rocks Ahead* he took a somewhat dark view of the future of England; and regarded some present tendencies as pregnant with danger; anticipating with sorrow the political supremacy of the lower classes, the approaching industrial decline of England, and the divorce of the intelligence of the country from its religion. His attitude towards evangelical Christianity was strongly skeptical. He was a frequent contributor to the *Pall Mall Gazette.* His works include *The Creed of Christendom* (1851); *Essays on Political and Social Science* (1854); *Literary and Social Judgments* (1869); *Political Problems* (1870); *Enigmas of Life* (1872); *Rocks Ahead, or the Warnings of Cassandra* (1874); *Mistaken Aims* (1876); *Miscellaneous Essays* (2d series, 1884).

GREGALE, n. *grĕ-gāl'* or *grĕ-gâ'lĕ:* a cold dry n.e. wind blowing over Malta, having an origin similar to the *mistral,* which see.

GREGARINA, n. *grĕg'ă-rī'nă* [L. *gregārĭŭs*, belonging to a herd or flock—from *grex*, a flock]: a very minute and simple parasite belong to the Protozoa.

GREGARINIDÆ, *grĕg-ar-ī'nĭ-dē:* term applied by Leon Dufour to a group of microscopic organisms belonging to the sub-kingdom *Protozoa*, which have been discovered as parasites in the intestinal canal in various invertebrate animals, especially insects, arachnidans and certain chætopodous worms. They seem to have been observed first by Cavolini in the 18th c., but the earliest systematic notice of them is that of Dufour 1828, who gave them their name from the groups in which they occurred.—The principal genus of the G. is *Gregarina*, often called Gregarines.

The form of the body varies: it may be cylindrical, ovate, fusiform, or threadlike. It is often marked by indentations or strictures corresponding to the spot where an internal septum divides the organism into two or more segments. In some, a process projects from one end of the body, or there may be two lateral processes, and to these prolongations minute hooks are attached (see *d* in fig. 1), by which it is supposed that these animals attach themselves

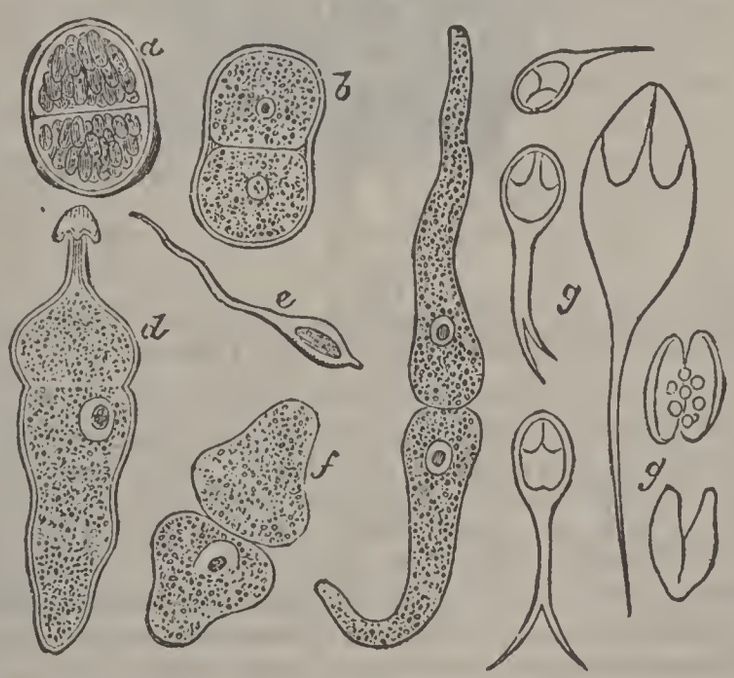


Fig. 1.

c. f, b. a, successive stages of conjugation, the last containing pesudo-naviculæ; *c*, psuedo-navicula; *d*, a dicystidean form; *g*, various psorospermiæ.—From Greene's *Protozoa*.

to the surfaces on which mostly they are found. Anatomically, the G. consist of an extensible transparent membrane inclosing a granular mass, in which is a nucleus surrounded by a clear space: see CELL THEORY. These organisms are colorless; their locomotive powers seem very limited; and they have neither mouth nor feet.

By a careful observer, under the microscope two of them are seen to come in contact. The surfaces in contact become flattened, and a cyst or capsule forms around them and incloses them (see *f* and *a* in fig. 1). Numerous globular vesicles are then produced in the interior, and these become ulti-

mately metamorphosed into peculiar bodies, termed *pseudo-naviculæ* (*a, e,* in the fig). The septum by which the two G. were at first divided, finally disappears; the cyst bursts, and the pseudo-naviculæ escape, and in due time burst also; and thus give rise to bodies closely resembling amœbæ (fig.

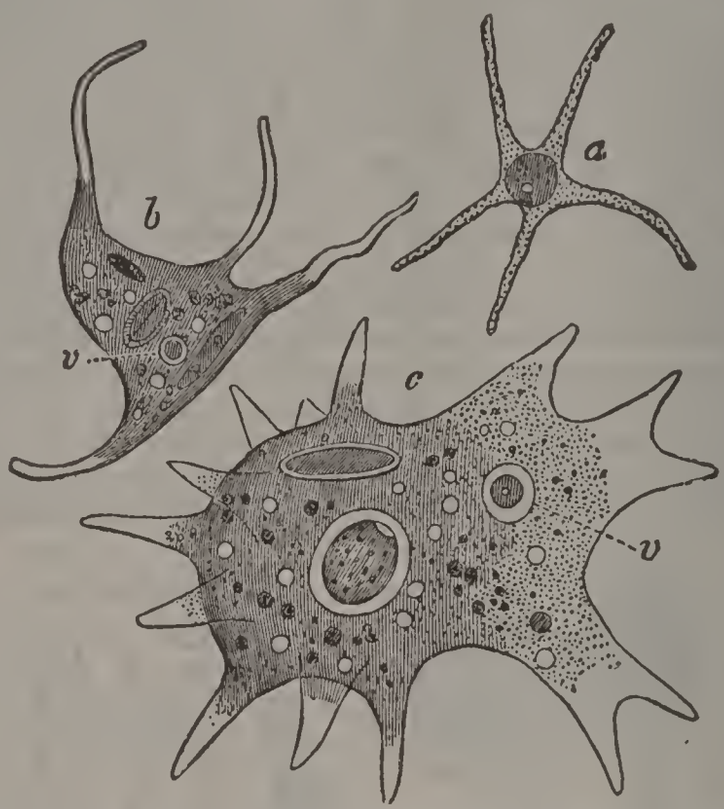


Fig. 2.

a, young amœba; *b*, older specimen; *c*, another form; *v*, a body resembling a nucleus.—From Greene s *Protozoa.*

2), minute animals belonging to the Rhizopoda (q.v.), which at length develop themselves into young gregarinidæ The coalescence or conjugation of the G. is not positively essential to the formation of pseudo-naviculæ, since they are sometimes seen to occur within the bodies of single animals. E. Van Beneden has described a remarkable form, as much as two-thirds of an inch in length (*G. gigantea*), from the intestine of the lobster. From its pseudo-naviculæ, amœbiform embryos arise in the usual manner ; but these soon become globular,and then bud out two long processes, of which one is actively contractile, the other still. The former detaches itself, and has a period of separate activity, during which it may be readily mistaken for a nematode worm, and is hence termed a *pseudo-filaria.* Both the pseudo-filaria and the original mass then elongate and stiffen into the adult form.—The G. are conveniently divided into two groups: (*a*) the *Monocystidea,* one-celled, with a central nucleus (see fig. 1, *c*, which shows two conjugating); and (*b*) the *Dicystidea,* spuriously two-celled with a nucleus in the posterior portion (see fig. 1, *d*). (Formerly the G. were by some regarded as infusoria, by others as worms, and by others as vegetable forms.)—Certain other minute organisms, occurring especially in the muscles and viscera of fishes and higher vertebrates, and

known as *Psorospermiæ* are believed to be embryonic forms (pseudo-naviculæ?) of unknown gregarines. See Huxley, *Anat. of Invertebr. Animals;* Claus, *Zoologie.*

GREGARIOUS, a. *grĕ-gā′rĭ-ŭs* [L. *grĕgārĭŭs,* pertaining to a herd—from *grex* or *grĕgem,* a flock: Gael. *greigh,* a flock: It. *gregario*]: having the habit of associating or living in flocks and herds; not living alone. GREGA′RIOUSLY, ad. *-lĭ.* GREGA′RIOUSNESS, n.

GREGG, *grĕg,* DAVID MCMURTRIE: soldier: b. Huntingdon, Penn., 1833, Apr. 10. He graduated at the U. S. Milit. Acad. 1855: was appointed 2d lieut. of dragoons, Sep.; served in Indian campaigns in N. Mex. and Cal. 1858–60; was promoted 1st lieut. 6th U. S. cav. 1861, Mar., and capt. May; appointed col. 8th Penn. cav. 1862, Jan.; brig.gen. of vols. 1862, Nov.; commanded a div. of cav. in army of the Potomac 1862, Dec.—1863, June, and the 2d cav. div. in the Richmond campaign 1864, Apr.—1865, Feb.; brevetted maj.gen of vols. 1864, Aug. 1; and resigned 1865, Feb. 3. In 1874 he became U. S. consul at Prague; in 1891 was auditor-general of Pennsylvania, since 1886 has been commander of the military order of the Loyal Legion for Pennsylvania and since 1904 commander-in-chief for the United States.

GREGG, JOHN IRVIN: soldier: b. Bellefonte, Penn., 1826, July 19; d. 1892, Jan. 6. In 1846, Dec. he enlisted as a private for the Mexican war; 1847, Feb., was appointed 1st lieut. 11th U. S. inf., and Sep. promoted capt.; and after serving through the war was mustered out 1848, Aug. 14. He was appointed capt. 6th U. S. cav. 1861, May, and col. 16th Penn. cav. 1862, Oct., and commanded a cav. brigade in the army of the Potomac 1863, Apr.—1865, Apr. He was brevetted maj., lieut.-col., col., and brig.gen. U. S. A., and maj.gen. of vols., became inspector-gen. of freedmen in La. after the war, was promoted col. 8th U. S. cav. 1866, and retired 1869.

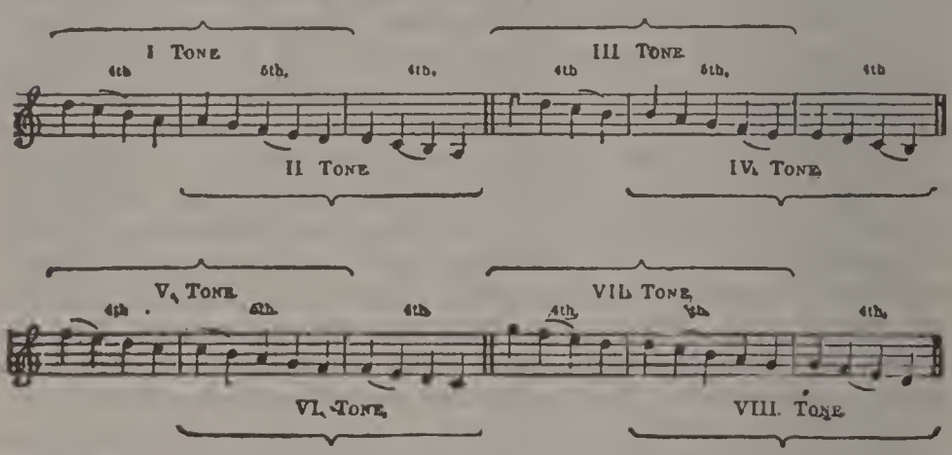
GREGOIRE, *grā-gwâr′,* HENRI: the most remarkable of the so-called 'constitutional' bishops of France: 1750, Dec. 4—1831, May 23; b. at Vebo, near Luneville; of poor parents. Having received his education from the Jesuits at Nancy, he entered priest's orders, and for some time held a professorship at the Jesuit College of Pont-à-Mousson. He published, 1778, *Amelioration of the Condition of the Jews,* which attracted considerable notice, was translated into English, and crowned by the Royal Soc. of Metz. Gregoire, soon after his ordination, was appointed curé of Embermesnil, in Lorraine; and at the election for the states-general 1789, he was chosen one of the deputies of the clergy. An ardent Democrat in all his views, he attached himself from the first to the Tiers-état party, and was prominent in the subsequent drama; he was one of the chief advisers of the secession, took the oath of the Tennis Court with the rest, and with much ability supported the Abbé Sieyes

in the proposal for constituting the seceders into the national assembly, of which he became one of the secretaries. From that time G. pursued his course without hesitation. He was one of the most enthusiastic on occasion of the famous session of the night of Aug. 4, in the abolition and renunciation of the privileges of the nobles and clergy. G. carried into every department the stern democracy to which he was devoted, and which he identified with the Christian brotherhood of the gospel. He was always sincere, tolerant, consistent. Upon the fundamental doctrine of the Revolution—the 'rights of man'—he sought to ingraft his own early advocacy of the Jews and of the negroes. Carrying the same views into questions of church-polity, he was a zealous supporter of the civil constitution of the clergy, was the first of his order to take the oaths, and was elected the first 'constitutional bishop' of the dept. of Loir-et-Cher. He was chosen for two places, but accepted this, though the old and legitimate bishop, Monseigneur de Themines, was still alive. When at the blasphemous Feast of Reason, the miserable Gobel, constitutional Bishop of Paris, having publicly renounced Christianity, a similar renunciation was demanded from G. by the infuriated rabble, he firmly confronted the danger, and refused. Through the later phases of the Revolution, under the directory, G. continued to take a part in public affairs; and to his interference are due many of the measures connected with literature and science, which still bear fruit in the French system of administration. After the 18th Brumaire, he became a member of the corps legislatif. His extreme republicanism was highly distasteful to Bonaparte, and it was only after a third attempt that he was appointed member of the senate. On the conclusion of the concordat between Pius VII. and Bonaparte, he ceased to exercise ecclesiastical functions, as he could not be induced to give the retractations which the church authorities required. True to his old principles, he resisted every step toward the establishment of the absolute authority of Napoleon; and, in 1814, he was one of the first to pronounce against the empire. On the restoration, he was one of the most earnest in demanding from the king the acceptance of the constitution. During 'the Hundred Days,' he attracted no notice; but after the return of the king, he was excluded from the senate, and ceased thenceforth to hold any public place. During this enforced retirement, and in the intervals of leisure in his earlier political life, he published several works, literary, religious, political, historical, and polemical, the most voluminous of which are a *Cronique Religieuse*, 6 vols. and a *Histoire des Sectes Religieuses*, 6 vols., but incomplete. When he was on his death-bed, an effort was made by the Abp. of Paris to induce him to express his regret for the uncanonical and schismatical proceedings of his early career; but he persistently declined to make any retractation, and the abp. directed that the last rites of the church should be withheld. Nevertheless, the last sacraments were administered to G. by the Abbé Guillon.

GREGORIAN, a. *grĕ-gō'rĭ-ăn:* denoting what pertains to Gregory, the name of several popes. GREGORIAN CALENDAR AND YEAR, the calendar as reformed by Pope Gregory XIII., 1582 (see CALENDAR).

GREGO'RIAN CHANT, or GREGORIAN TONES: a class of choral melodies introduced into the service of the early Christian Church by Pope Gregory the Great, near the end of the 6th c. The music of the church in earlier times was founded on the Greek system as far as it could be used, which was improved from time to time, until St. Ambrose, Bp. of Milan, 4th c., invented the AMBROSIAN CHANT: see AMBROSIAN CHANT. In 599, Pope Gregory began to reform and improve the music of the church at Rome, by discarding the Greek tetrachord, or scale, on the basis of a fourth, and in its place substituting the scale of the octave, which some writers say he named by the letters of the alphabet, while others say he had a peculiar set of signs called *nota Romana*, consisting partly of words with points, strokes, and other marks, which sufficiently served his purpose. To the authentic modes of Ambrosius, Gregory added the plagal, which began with the fourth below, and thus he completed the octave. He retained the four most useful modes of the Ambrosian chant, termed the *Dorian*, *Phrygian*, *Lydian*, and *Mixolydian*, supposed to have been obtained from the ancient Greeks. At first Gregory's improvement was called the *Roman chant*, but later it got the name of *cantum planum* ('plain song'—q.v.) or *firmum*, as it was originally sung in unison, and in notes all of the same length. At a later period, the letters of the Roman, as well as of the Greek alphabet, were used to express the notes of the G. C., but without any general fixed order or rule. In course of time, the system of notation on lines and spaces came into use; but at first only four lines were used, on which we find all the old examples of the G. C. written. By the Gregorian tones, or modes (*toni*, *modi*) of Gregory, must be understood a certain melodious formula, made out of the union of a perfect fifth and a perfect fourth, or their inversion, to give the church-song greater variety. All the old writers agree as to the diatonic genus of the Gregorian tones, but they do not all agree as to the number of the tones; some counting 14, others 12, while in some old Roman choral-books we find only 11. The foundation of the system of the Gregorian tones may be explained thus: As there are seven notes from *a* to *g*, there should be at least seven different modes, or tone-systems, varying from each other according to the position of the semitones; but as the final or key-note of each mode might be the first note, or might be in the middle, the same scale could therefore, as it were, be viewed from two sides, which gave rise to the 14 system of tones. It was, however, found that two of those were at variance with a fundamental rule of church-song—viz., that every mode or scale must possess a perfect fifth or perfect fourth; and that the modes containing a false fifth from *b* natural to *f* natural, or a false fourth from *f* to *b*, could not be used, and on account of the dissonant character

of these intervals must be rejected. This reduced the number of the tones to 12. It was further found that as four of the 12 were merely transpositions of some of the others, there were really only eight, and that they were in every respect sufficient for all purposes of church-song. The eight Gregorian tones, as they are handed down to us, were in time fixed by a royal mandate of Charles the Great—*octo toni sufficere videntur.* The following example in modern notation in the G. clef shows the position of the eight Gregorian tones:



There cannot be a doubt that Pope Gregory greatly improved the church music at the time, and that the eight tones have always been ascribed to him. That they are of great antiquity is certain, for we find them mentioned in a treatise on choral singing by one Aurelian, 9th c. The different character of the Gregorian tones depends entirely on the places of the semitones, which in the above example are marked ⁀. Several of the tones have various endings, some as many as four, while the second, fifth, and sixth tones have each only one ending. Consult Haberl, *Magister Choralis;* Kienle, *Choral-Schule;* Gietmann, *Kunstlehre* (Vol. III.); Kornmüller, *Lexikon der Kirchlichen Tonkunst;* Gevaert, *La Melopée Antique dans le Chant de l'Église Latine;* the Benedictines of Solesmes, *Paléographie Musicale;* Dechevrens, *Etudes de Science Musicale.*

GREGORIAN LITURGY, the ritual which Pope Gregory I. introduced after 590 in the Roman Catholic Church in the administration of the Eucharist, as exhibited in the book entitled *Gregorianum Sacramentarium.* St. Gregory made a new arrangement of the liturgy of Gelasius, which was previously in use, expunging from it what seemed to him useless and adding a very few new prayers. The celebration of the mass is still essentially the same as it was then.

GREGOROVIUS, *grā-gō-rō′vē-ŭs,* Ferdinand: German historian: b. in East Prussia, 1821. He studied for the clerical profession, at Königsberg, but soon turned to poetry and literature. In 1852 he went to Rome, where he has subsequently spent most of his time. His great work is the *History of the City of Rome in*

the Middle Ages (8 vols. 1859–72; 3d ed. 1875). He has written also on Italian geography and history, on Corsica, on the graves of the popes, and on Lucrezia Borgia.

GREGORY, *grĕg'o-rĭ*, THE GREAT (Saint), Pope: one of the four Doctors of the Latin Church (Ambrose, Augustine, and Jerome, the other three): abt. 540-604, Mar. 12 (pope 590–604); b. Rome; of an illustrious Roman family. He was the first of 16 popes of this name. His father, Gordianus, was a senator, and one of the earlier pontiffs; Felix III. had belonged to the same family. At a comparatively early age Gregory was named by Emperor Justin II. to the important charge of prætor of Rome; but he voluntarily relinquished this office, and withdrew, prob. abt. 575, from the world into St. Andrew's monastery which he had founded in Rome. This was but one of many such acts of religious munificence; 'He founded and endowed,' says Dean Milman, 'six monasteries in Sicily.' Before entering the Roman convent, equally founded by himself, which he chose for his own retreat, 'he lavished on the poor all his costly robes, his silk, his gold, his jewels, his furniture, and not even assuming to himself the abbacy of his convent, but beginning with the lowest monastic duties, he devoted himself altogether to God.' He was elected abbot of his monastery, and while he was in this office, the well-known incident befell of his meeting the Anglo-Saxon youths in the slave-market, and on being struck by their beauty, and learning that they came from a pagan land, resolving to devote himself to the conversion of that land to Christianity. He set forth on his journey, but the clamor of the Romans at his loss led the pope Benedict to compel his return, and eventually to enroll him in the secular ministry by ordaining him one of the seven regionary deacons of Rome. Benedict's successor, Pelagius II., sent Gregory as nuncio to Constantinople, to implore the emperor's aid against the Lombards. He resided three years in Constantinople, during which time he commenced, and perhaps completed, his great work, *Exposition of Job*. Returning to Rome he resumed his place as abbot, and on the death of Pelagius, in a plague which laid waste the city, Gregory was unanimously called by the clergy, the senate, and the people to the papal chair. He used all means to evade the dignity, even to a petition to Emperor Maurice to withhold his consent; but he was forced to yield, and was consecrated 590, Sep. 3. Few pontiffs have equalled, hardly one has surpassed Gregory as the administrator of the multiplied concerns of the vast charge. 'Nothing,' says Dean Milman, 'seems too great, nothing too insignificant for his earnest personal solicitude; from the most minute point in the ritual, or regulations about the papal forms in Sicily, he passes to the conversion of Britain, the extirpation of simony among the clergy of Gaul, negotiations with

the armed conquerors of Italy, the revolutions of the Eastern Empire, the title of Universal Bishop usurped by John of Constantinople' (*Latin Christianity*, I. 439). There is no department of ecclesiastical administration in which he has not left marks of his energy and his greatness. To him the Roman Church is indebted for the complete and consistent organization of her public services and the details of her ritual, for the regulation and systematization of her sacred chants. The mission to England, which he was not permitted to undertake in person, was intrusted by him, with all the zeal of a personal obligation, to Augustine (q.v.) (Abp. of Canterbury); and, under his auspices, Britain was brought within the pale of Christian Europe. Under him the Gothic kingdom of Spain, long Arian, was united to the church. Nor was his zeal for the reformation of the clergy, and in purifying the morality of the church, inferior to his ardor for its extension. His letters, numerous and interesting, are full of evidences of the universality of his vigilance. On occasion of the threatened invasion of Rome by the Lombards, Gregory is declared by Milman to have 'exercised the real power by performing the protecting part of a sovereign;' and in his general administration, to have been 'in act and in influence, if not as yet in avowed authority, a temporal sovereign.' Against the memory of his administration of Rome a charge was formerly made, that in his zeal against paganism he destroyed the ancient temples and other buildings of the pagan city; but Gibbon confesses that the evidence 'is recent and uncertain;' and, indeed, the only authority to which Gibbon himself refers, Platina, mentions the charge in order to repudiate it. The same, according to Milman, may be said of 'the fable of his having burned the Palatine Library in his hatred of pagan literature, which fable is now rejected.' As regards the general government of the church, Gregory reprobated very strongly the assumption by John, patriarch of Constantinople, of the title of Ecumenical or Universal Bishop; especially as the object of John in assuming this title was to justify an exercise of jurisdiction outside the limits of his own patriarchate. In Gregory's writings, too, the details of the whole dogmatical system of the modern church are very fully developed. His works fill four folio vols. His *Letters*, and, still more, his *Dialogues*, abound with miraculous and legendary narratives, which show his lack both of critical acumen and of literary taste. Gregory, with all his zeal for the uniformity of the Roman ritual and the ascendency of the Roman hierarchy, and the prevalence of the dogmas of his church, was most gentle in his treatment of heathens and Jews; and he used all his efforts to repress slave-dealing, and to mitigate the severity of slavery.

GREG'ORY II., Saint, Pope: of Roman birth; d. 731 (pope 715 or 716–731). His pontificate is noticeable as

forming an epoch in the progress of the territorial pre-eminence of the Roman see in Italy. The eastern emperors having almost utterly abandoned the government, and, still more, the defense of Italy, and the aggressions of the Lombards becoming every year more formidable, the imperial authority in the west sank into little more than a name; and the tyrannical and barbarous measures by which Emperor Leo, the Isaurian, attempted to enforce his decrees against image-worship, weakened still more the tie which bound Italy to the eastern emperors. The natural result of the diminution of the imperial authority in Italy was the growth of that of the pope, to whom the deserted Italian provinces looked, partly as their spiritual counselor and head, partly as their mediator with the barbarous enemy, partly as the center of the political federation for self-defense which their very isolation necessitated. Gregory convened a council in Rome on the subject of the honor due to images, and addressed a very energetic letter to the emperor, protesting against the sacrilegious outrages of which he had been guilty, explaining and defending the Rom. Cath. doctrine on image worship, and warning the emperor that the feelings of his subjects were so completely alienated by his conduct, that it was only the pope's influence which prevented them from throwing off all allegiance. Gregory has been accused of himself fomenting this disaffection. The contrary, however, is attested, not only by Gregory's own letters, but also by Paul the Deacon, in his *History of the Lombards* (book vi. c. 39); and it is certain that the circumstances themselves, and the well-known character of the emperor, would sufficiently explain any degree of discontent in Italy. At all events, the result of the contest was a most notable aggrandisement of the political authority and influence of the popes in Italy.

GREG'ORY, III., Saint, Pope: b. Syria; d. 741, Nov. 29 (pope 731-741). The encroachments of the Lombards in Italy during his pontificate became so formidable, that as the eastern emperors still remained powerless or indifferent to the protection of the Italian provinces, the Romans charged Gregory to send a deputation to Charles Martel, soliciting his succor against the enemy, and proposing, on that condition to recognize him as their protector, and to confer on him the title of consul and patrician of Rome. This offer was made by the pope 'in virtue of a decree of the Roman primus,' and is of great historical importance in the consideration of the nature and origin of the papal power in Italy. The embassy failed, owing to the pressure of his war with the Saracens, to enlist the aid of Charles; but it was a step toward the consummation of the independence of the West.

GREG'ORY VII., Saint (Hildebrand), Pope: abt. 1015–1085, May 25 (pope 1073–1085); b. Saona, a village in the s. border of Tuscany: pre-eminent histor-

ical representative of the temporal claims of the mediæval papacy. Whether his family belonged to the burgher or the noble class, is disputed by his biographers. His family name, Hildebrand, would imply a Teutonic descent; but by birth and education, at least, he was Italian. His youth was passed at Rome, in the monastery of St. Mary on the Aventine, of which his uncle, Laurence (afterward Bishop of Amalfi), was abbot. From Rome, he passed into France, where he entered the celebrated monastery of Cluny, in the schools of which he completed his education; and from the strict ascetic observances there practiced by him he acquired those habits of austerity which distinguished his entire life. He visited the court of Henry III., and obtained by his preaching the reputation of great eloquence. On his return to Rome, he became the chaplain of Gregory VI., but after the death of that pontiff, he again withdrew to his former retreat at Cluny, from which he was recalled only by the earnest appeal of the new and zealous pope, Leo IX., whom he accompanied to Rome 1049. Under this active and devoted pontiff, Hildebrand exercised great influence. He now, for the first time, entered into holy orders, and was eventually created cardinal. Besides the important domestic employments which were assigned to him, he was sent as legate to the important council of Tours, in which the cause of Berengar was examined. Under all the short but important pontificates of the successors of Leo IX., known in history as the German popes—Victor II., Stephen IX., Benedict X., and Alexander II—Hildebrand continued to exercise the same influence, and by inspiring into their government of the church the great principles to which his life was vowed, he prepared the way for the full development of his own theory of the papacy. He was unanimously elected at Rome, without awaiting the imperial authorization, three days after the death of Alexander II. The German bishops, who feared the strong arm of those reforms of which his name was a guarantee, endeavored to prevent Emperor Henry IV. from assenting to the election; but Henry gave his approval, and the new pope was crowned, 1073, July 10. From the date of his election, the pontificate of Gregory was one long struggle for the assertion of the principles with which he believed the welfare of the church and the regeneration of society itself to be inseparably bound up. Regarding as the great evil of his time the thoroughly secularized condition of the church in a great part of Europe, especially in Germany and n. Italy, he directed against this all his efforts. The position occupied by the higher clergy as feudal proprietors, the right of investiture with the temporalities of benefices claimed by the crown, the consequent dependence of the clergy upon the sovereign, and the temptation to simony (see SIMONY) which it involved, were, in the mind of Gregory, the cause of all the evils

under which Europe was groaning; and of all these he regarded investiture (see INVESTITURE), as the source. While, therefore, he labored by every species of enactment, by visitations, by encyclical letters, and by personal exhortations, precepts, and censures, to enforce the observance of all the details of discipline—celibacy, the residence of the clergy, the instruction of the people —and to repress simony and pluralism, it was against the fundamental abuse of investiture that his main efforts were directed. In the year after his election, he prohibited this practice, under pain of excommunication both for the investor and the invested, and in the following year he actually issued that sentence against several bishops and councilors of the empire. Emperor Henry IV. (see HENRY IV.), disregarding these menaces, and taking the offending bishops under his protection, Gregory cited him to Rome, to answer for his conduct. Henry's sole reply was a haughty defiance; and in a diet at Worms 1076, he formally declared Gregory deposed from the pontificate. Gregory was not slow to retaliate by a sentence of excommunication; and in this sentence, unless revoked or removed by absolution in twelve months, by the law of the empire at the time, was involved the forfeiture of all civil rights, and deposition from every civil and political office. Henry's discontented Saxon subjects appealing to this law against him, he was compelled to yield, and, by a humiliating penance, to which he submitted at Canossa, 1077, Jan., he obtained absolution from the pope in person. This submission, however, was but feigned; and on his subsequent triumph over his rival, Rudolf of Swabia, Henry resumed hostilities with the pope, and in 1080 again declared him deposed, and caused to be appointed in his place the antipope Guibert, Abp. of Ravenna, under the title Clement III. After a protracted siege of three years, Henry, 1084, took possession of Rome. Gregory shut himself up in the castle of St. Angelo. When Gregory was on the point of falling into his enemy's hands, Robert Guiscard, Norman Duke of Apulia, entered the city, set Gregory free, and compelled Henry to return to Germany; but the wretched condition to which Rome was reduced obliged Gregory to withdraw first to Monte Cassino, and ultimately to Salerno, where he died. His dying words are a deeply affecting, but yet a stern and unbending profession of the faith of his whole life, and of the profound convictions under which even his enemies acknowledge him to have acted: 'I have loved righteousness and hated iniquity: therefore I die an exile.' The character of Gregory VII., and the theory of churchpolity which he represents, are differently judged by the different religious schools; but his theory is confessed by all, even those who most strongly reprobate it as an excess, to have been grand in its conception, and unselfish in its object. 'The theory of Augustine's city of God,' says Milman, 'no doubt swam before his

mind, on which a new Rome was to rise, and rule the world by religion.' In his conception of the constitution of Christian society, the spiritual power was the first and highest element. It was to direct, to command the temporal, and, in a certain sense, to compel its obedience; but as the theory is explained by Fénelon, by Gosselin, and other modern Rom. Catholics, the arms which it was authorized to use for the purpose of coercion were the arms of the spirit only. It could compel by penalties, but these penalties were only the censures of the church; and if, in certain circumstances, temporal forfeitures (as in the case of Henry IV.) were annexed to these censures, this, it is argued, was the result of the civil legislation of the particular country, not of any general ecclesiastical law. Thus, in the case of Henry, the imperial crown was forfeited, according to the Swabian code, by the mere fact of the emperor's remaining 12 months under excommunication without obtaining absolution from the sentence. Moreover, whatever may be said of the power in itself, or if the lengths to which it has at times extended, the occasion and the object of its exercise in the hands of Gregory were always such as to command the sympathy of the philosophical student of the history of the middle age. By his firm and unbending efforts to suppress the unchristian vices which deformed society, and to restrain the tyranny which oppressed the people as much as it enslaved the church, he taught his age 'that there was a being on earth whose special duty it was to defend the defenseless, to succor the succorless, to afford a refuge to the widow and orphan, and to be the guardian of the poor.' Dean Milman sums up his history of Gregory as of one who is to be contemplated not merely with reverence but in some respects, and with some great drawbacks, as a benefactor of mankind.—See Milman's *Latin Christianity*, III.; Bowden's *Life of Gregory VII.* (1840); Voigt's *Hildebrand als Papst*; Villemain's (1872) and Langeron's (1874) lives of Gregory.

GREG'ORY XIII. (Ugo Buoncompagno), Pope; 1502, Feb. 7—1585, Apr. 10 (pope 1572–85); b. Bologna. He was educated in his native city, where he held the professorship of law for several years. He settled at Rome 1539, was distinguished by several important employments, and was one of the theologians of the council of Trent. On his return from Trent he was created cardinal 1564, and sent as legate to Spain. On the death of Pius V., Gregory was elected pope. Not one among the post-reformation pontiffs has surpassed Gregory in zeal for the promotion and improvement of education: a large proportion of the colleges in Rome were wholly or in part endowed by him: and his expenditure for educational purposes is said to have exceeded 2,000,000 Roman crowns. An important event of his pontificate is the correction of the calendar (see

CALENDAR), the result of long consideration, made public 1582. A grievous imputation rests on the memory of Gregory from his having ordered a *Te Deum* in Rome on occasion of the massacre of St. Bartholomew (see ST. BARTHOLOMEW); though in justice it must be said, that this was done on the report of the French ambassador, which represented that bloody event, not as a deliberate aggression on the part of the Rom. Catholics, but simply as the suppression of a baffled Huguenot conspiracy. Gregory published a valuable edition of the *Decretum Gratiani* with learned notes.

GREG'ORY XVI. (BARTOLOMMEO ALBERTO CAPPELLARI), Pope of Rome: 1765, Sep. 18—1846, June 1 (pope 1831–46); b. Belluno, Italy. He entered the order of Camaldolese monks under the name of Mauro 1783; became noted for his theological acquirements and proficiency in oriental languages; published a controversial work against the Italian Jansenists, *Il Trionfo della Santa Sede e della Chiesa*, 1799; was elected a member of the Acad. of the Cath. Religion in Rome 1801; became a censor of the acad., vice-procurator-gen. of his order, and abbot of his monastery in Rome, 1807; and retired to the monastery of St. Michael at Murano after the abduction of Pius VII., 1809. On the restoration of the pope he was recalled to Rome and appointed procurator-gen. and vicar-gen. of his order, consultor of the Propaganda, and commissary for examining works on oriental liturgical literature. He became cardinal-priest and prefect of the Propaganda 1826, and after a 50-days' conclave was elected pope 1831, Feb. 2. He greatly extended the sway and power of the Rom. Cath. Church, and stimulated the study of the sciences and arts. Gregory was succeeded as pope by Pius IX.

GREGORY, DANIEL SEELY, D.D.; minister, author, and editor: 1832, Aug. 21; b. Carmel, N. Y. He graduated at the Coll. of N. J., 1857, and at Princeton Theol. Sem. 1860; was tutor of rhetoric and belles lettres in the Coll. of N. J., 1858–60; Presb. pastor at Galena, Ill., 1860; Troy, N. Y., 1863; New Haven, Conn., 1866; and South Salem, N. Y., 1869. He became prof. of metaphysics and logic in Wooster Univ., Ohio, 1871, and of mental science and Eng. literature, 1875; pres. of Lake Forest Univ., Ill., 1878–86. Removing to New York he was managing editor of the *Standard Dictionary*, 1890–94, and editor of the *Homiletic Review* 1895–1904. Among his published works are *Christian Ethics* (1875); *The Key to the Gospels; or, Why Four Gospels?* (1876); *Practical Logic* (1881); *Christ's Trumpet-call to the Ministry* (1896); *The Crime of Christendom* (1900); *Bible League Primer No. 1* (1904). He has been General Secretary of the American Bible League and managing editor of the *Bible Student and Teacher* since 1904.

GREGORY. DAVID: 1661–1708; b. Aberdeen; son of David Gregory of Kinardie. He was educated at Aberdeen and at Edinburgh schools. In 1691, through the friendship of Newton and Flamsteed, he obtained the vacant Savilian professorship of astronomy at Oxford. Among Dr. Gregory's works were: *Exercitatio Geometrica de Dimensione Figurarum* (Edin. 1684); *Catoptricæ et Dioptricæ Sphæricæ Elementa* (Oxford, 1695), the substance of his Edinburgh lectures in which Dr. Hutton thinks there is an anticipation of Dolland's achromatic telescope; *Astronomiæ Physicæ et Geometricæ Elementa*, Oxford 1702; and an edition of Euclid in Greek and Latin, highly valued, 1703. Toward the end of his life he worked with Dr. Halley on an edition of the *Conics of Apollonius*. He was the first who considered the Catenary, on which he left a paper in MS., besides a short treatise of the *Nature and Arithmetic of Logarithms;* a treatise on *Practical Geometry*, published 1745 by Maclaurin; and many memoirs in the *Phil. Trans.*, XVIII—XXV.

Of his four sons, the eldest, DAVID GREGORY, became regius professor of modern history at Oxford, and Dean of Christ's Church. When Dr. David Gregory (the father) removed to Oxford, he was succeeded, 1691, in the Edinburgh chair, by his brother JAMES (son of David Gregory of Kinardie), who filled it 33 years, when he retired, and gave place 1725 to Maclaurin. Another brother, CHARLES GREGORY, was professor of mathematics at St. Andrews 1707–39, and was succeeded by his son, DAVID GREGORY, who died 1763. The three sons of David Gregory of Kinardie were thus, at the same time, professors of mathematics in three universities, and two of them left sons who obtained professorships. Dr. Thomas Reid, of Glasgow, was nephew, through his mother, of these illustrious brothers. Altogether, it is said (Chalmer's *Biographical Dictionary*, p. 289) that no less than 16 members of this family have held British professorships.

GREGORY, FRANCIS HOYT: 1789, Oct. 9—1866, Oct. 4; b. Norwalk, Conn.: naval officer. He was bred to the sea, served on a merchantman 1807–9, was appointed midshipman U.S.N. 1809, commissioned lieut. 1814, commander 1828, capt. 1838, and retired as rear admiral 1862, July 16. He served with Com. Chauncey on the lakes 1812–14; was taken prisoner 1814, Aug., and confined 14 months in England; made several notable captures of pirates in the W. Indies and Gulf of Mexico; was on blockading duty during the Mexican war; and was supt. of the construction of all war vessels outside the navy yards from 1861, July, till his death.

GREGORY, JAMES: 1638–75: b. Aberdeen; of a Scotch family distinguished in the history of science; son of the Rev. John Gregory, minister of Drumoak, Aberdeenshire. He studied at Marischal College, and betook himself to optical science, in which he made his

first discoveries. At the age of 24, he invented the reflecting-telescope known by his name, and described in his work *Optica Promota.* In 1664 or 1665, he went to London with a view to the construction of his telescope; but finding the artists lacking in skill, he passed on to the Univ. of Padua, where he applied himself to study; and 1667, produced *Vera circuli et Hyperbolæ Quadratura;* followed, 1668, by *Geometriæ Pars Universalis,* and *Exercitationes Geometricæ.* These works led him into correspondence with the greatest mathematicians of the age—Newton, Huyghens, Wallis, etc. Returning to London, he was elected a fellow of the Royal Soc.; and 1669 he obtained the professorship of mathematics at St. Andrews. There, 1672, he produced *The Great and New Art of Weighing Vanity,* etc., which bore to be the work of M. Patrick Mathers, Archbedal to the Univ. of St. Andrews, the object of which was to expose the ignorance of a Prof. Sinclair of Glasgow, who had put a slight on one of the St. Andrews professors. In 1674, Gregory (who had married Mary, daughter of George Jamieson, painter), was called to Edinburgh to the mathematical chair which he filled for little more than a year. In 1675, Oct., when showing the satellites of Jupiter to some of his pupils, he was struck with total blindness, and a few days afterward died at the age of 36. For a particular list and account of his works and discoveries, see Hutton's *Philosophical and Mathematical Dictionary.*

He had a son, JAMES GREGORY, M.D. (b. 1674), who became prof. of medicine in King's College, Aberdeen, where he founded the School of Medicine. This James Gregory, had two sons, JAMES GREGORY, M.D. (the second), who succeeded his father in the Aberdeen professorship; and JOHN GREGORY, M.D. (q.v.).

GREGORY, JOHN, M.D.: 1724–1773, Feb. 9; b. Aberdeen. He received his early education there, and studied medicine at Edinburgh, Leyden, and Paris. After filling in succession the chairs of philosophy and medicine at Aberdeen, he was appointed 1766, professor of the practice of medicine in Edinburgh, where he long held high repute as a teacher and practicing physician, with the greatest personal popularity. He was the intimate friend of the most eminent men of Edinburgh in its most brilliant period. Among his works are—*Elements of the Practice of Physic,* 1772; *A Comparative View of the State and Faculties of Man with those of the Animal World,* 1765; and *A Father's Legacy to his Daughters* (published after his death), 1793. In 1788 his works were collected in 4 vols. 12mo, by Mr. Tytler (Lord Woodhouselee), who prefaced them by life of the author. A life of him also was written by Mr. Smellie. His son, JAMES GREGORY, M.D. (the third), became distinguished as prof. of the practice of medicine at Edinburgh, and a leading man in his profession; the author of *Philosophical and Literary Essays,* 2 vols. 8 vo, Edin. 1792.

The son of this Dr. James Gregory was WILLIAM GREGORY (1803–58); prof. of chemistry in King's College, Aberdeen, and later in the Univ. of Edinburgh. William Gregory was well known by his contributions to chemical science, and his edition of the inorganic part of Turner's *Elements of Chemistry;* the organic part of which was edited by Liebig. He also translated, 1855, *Liebig's Principles of Agricultural Chemistry.* He was one of the earliest advocates of Liebig's principles in Britain.—Another son of James Gregory, M.D. (the third) was DUNCAN FARQUHARSON GREGORY (1813–44), brother of William Gregory. He was a fellow of Trinity College, Cambridge, and prof. of chemistry; latterly applying himself to mathematics, with important results; author of *Examples in Differential and Integral Calculus.* His *Mathematical Writings*, ed. by W. Walton, appeared 1865.

GREGORY of NYSSA, *nĭs'sa* (SAINT): Greek Church-father: abt. 331–396 or 400; b. prob. at Neocæsarea; younger brother of Basil the Great. He early applied himself to sciences and philosophy, and subsequently married a pious and honorable lady. In consequence of a dream, however, he separated from her, and abjuring the world, entered on the duties of an ecclesiastic. After a short relapse into his old profane studies, he renounced this 'apostacy' forever, and 372 was made bp. of Nyssa, city in Cappadocia, in Lesser Armenia, to the dismay of the Arians, who knew him to be a zealous defender of the Nicene creed. They at once commenced an opposition to him. Gregory was deposed by the emperor, and compelled to flee. He lived for some years in seclusion, until, at the death of Valens (378), Gratianus restored him to his see. In 379, he was charged by the council of Antioch to visit the churches in Arabia and Palestine, in order to restore them to their pristine orthodoxy and peace, many years of heresy and dissension having made sad confusion among the flock of the faithful. In 381 he was chosen by the council of Constantinople to be one of the 'Centres' of faith for the Catholic communion, i.e., an arbiter of orthodoxy for his and other congregations, principally in Pontus. He further assisted at the councils in that city 382 and 3, and was so prominent in both, that shortly afterwards the honorable title of Metropolitan was unanimously conferred upon him. The last public appearances of Gregory seem to have been at the council at Constantinople 394, and at the consecration of a new church at Chalcedon. The second Nicæan council conferred on him the pre-eminent title of 'Pater Patrum.'

His writings are extremely numerous. Although not fraught with the glowing eloquence and penetrating acumen of Gregory Nazianzen, or St. Basil, they show greater depth of poetical feeling and philosophical thought, while they abound in practical teachings and wise councils. The frequent fanciful, often puerile sub-

tleties and conceits are to be put to the account of his times, when symbolism and allegory reigned supreme. Gregory was one of the first who manfully stood out for the ancient Greek—albeit heathen—philosophy. His writings are indeed fully imbued with Platonism and Aristotelianism, and he went so far as to borrow the technical terms of these masters for his theological investigations. 'As the Israelites borrowed from the Egyptians,' he said, 'so Christianity must carry with it all that is costly out of the pagan camp;' a saying which, however, has been attributed to some other fathers of the early church. His orthodoxy has been questioned in later times; chiefly for his strongly condemning as heathenish the view that religion was dependent mostly on the dogma: according to him, religion was more a matter of the heart and of feeling. His expectation of a universal restoration of men to holiness also has caused denial of his orthodoxy. The council of Ephesus solemnly and most energetically declared for the soundness of his teaching, refuting the heretics out of his own writings. For his Christology—in the main that of Origen—viz., that the Logos (q.v.) had penetrated all parts of the human nature, and thus elevated it to himself (see ORIGEN). The Latins celebrate the day of Gregory Jan. 10, the Greeks Mar. 9. His most celebrated works are a catechetic treatise; a dialogue of the Soul and Resurrection, called *Macrinia*, after his sister (supposed to have been held at her death-bed); a treatise on *The Holy Trinity and the Deity of the Holy Ghost*, besides a number of homilies. The first complete Latin edition of his writings, comprising dissertations on the Old and New Testament, dogmatical and controversial treatises, discourses, sermons, panegyrics, biographies, letters, etc., appeared at Cologne 1537 (folio), and was followed by others at Basel (1562-71), and Paris (1573,1603). The first Greek and Latin editions by the Jesuit Gretier appeared Paris (1615–18), 2 vols., fol., reprinted there 1638. Separate works of Gregory have been edited repeatedly, but scarcely any have appeared in any modern translation.

GREGORY OF TOURS, *-tôr*, SAINT (originally called GEORGIUS FLORENTINUS): historian of the Franks: b. between 539 and 543, d. 594, Nov. 17; b. at Clermont, Auvergne, of a family exalted by rank as well as by piety; youngest son of Florentius, a provincial senator. On the paternal side, he traced his descent from Vellius Epagatus, martyr of Lyon; on the maternal, from St. Gregory, Bishop of Langres. St. Gallus, Bishop of Clermont, Gregory's uncle, undertook his early education, and, after his death, Gregory continued his studies under St. Avitus, successor of Gallus in the bishopric. Ordained deacon, Gregory left Auvergne, and went to the court of Siegbert, King of Austrasia. Still very young, he was elected to the see of Tours, and consecrated by Giles, Abp. of Rheims. The first years of his

episcopacy were a season of great perplexity, owing to the constant contentions of the first Merovingian kings. His courage was equal to the test, and by openly resisting even royal authority on some occasions, he drew the hatred of Queen Fredegunda, and of her husband, King Chilperich, who seems then to have been a tool in her hands. Gregory was accused of seditious and treasonable actions, and summoned before a council of bishops 580. He defended himself with such clearness and vigor, that Chilperich himself from that moment became his admirer and friend, and charged him afterward with many important political missions. This royal partiality, however, does not seem to have prevented Gregory from occasionally calling the king a Herod and a Nero. No less favored by the king's successors, Gontram and Childebert II., Gregory did not fail to use all his influence with the court for the amelioration of the position of the church, and in behalf of his flock. His travels had, apart from their political purposes, at the same time the object of everywhere restoring peace and piety, so much needed in those days in convents and churches, among the clergy and the laity. His journey to Rome 590, so minutely described, is by recent investigations shown not to have taken place (see Dr. Kries, *De Greg. Tur. Vitæ et Scriptis*, p. 16). His last journey seems to have been to Orleans, whither he accompanied the king 593. He died shortly afterward at Tours, where he had been a bishop 23 years, He was canonized, and his day in the calendar is Nov. 17. His works comprise ten books of the Frankish history, *Gesta, Chronicon Francorum*—first attempt at French historiography—crude in style and without discrimination in materials; *A Book of the Glory of the Martyrs; Of the Miracles of St. Julian* (304); *Of the Glory or Miracles of the Confessors; Of the Miracles of St. Martin;* and a book of the lives of the fathers, consisting of 23 biographies of Frankish ecclesiastics; also many minor writings. Much more, however, is generally attributed to Gregory than is really his. The first critical edition of his works, by Ruinard, appeared Paris, 1699, fol.; another by Guadet and Taranne, 1837, with French translation; and the well-known edition by the Abbé Migne (1871) in his great collection of the Greek and Latin Fathers. See Lobell, *Gregor von Tours und seine Zeit* (Lpz. 1839; 2d ed. 1869).

GREGORY THE ILLUMINATOR (SAINT), or GREGORY OF ARMENIA: patriarch of Armenia, patron saint of the Armenian Church: b. abt. 257. As with the majority of the bishops of the primitive church, little is known of his early history. He is said to have been educated at Cæsarea, in Cappadocia, where he was instructed in the Christian religion. He entered into the service of Tiridates, King of Armenia, by whom he was subjected to severe persecution for his refusal to worship idols.

There is an amazing account of his 12 trials by torture, any one of which would have been certain death to any ordinary mortal. Some severe public calamity which succeeded, being viewed as a proof of divine wrath, the king immediately put himself and his subjects under Gregory's instructions. The people were converted in great numbers, and churches were soon built throughout the country; and Gregory, after receiving ordination at Cæsarea, returned as metropolitan of Armenia, 302, and baptized his converts. He died within a few years after 331, in which year he had withdrawn alone to a cave in the mountains. Many authors have given in their works discourses professedly by Gregory, now deemed spurious. The memory of Gregory is held in great reverence in the Greek Coptic, Abyssinian, and Armenian churches, and he is one of the saints of the Roman Calendar.

GREGORY NAZIANZEN, *grĕg'o-rĭ năz-ĭ-ăn'zen*, SAINT (surnamed THEOLOGUS, the Theologian): one of the four great fathers of the Eastern Church: 329–389 or 390; b. Arianzum, village near Nazianzus, in Cappadocia, not far from Cæsarea. His father, whose name also was Gregory, and who had originally belonged to the heathen sect of Hypsistatics, i.e., Worshippers of the Most High, but also of the fire, like the Persians, and keepers of the Jewish Sabbath and of the law concerning purity of meats, had, chiefly at the instigation of his pious wife Nonna, become a convert to Christianity about the time of the great Nicæan Council (325), and four years later was made bp. of Nazianzus. Formed to piety by domestic example, Gregory was early sent to finish his education in Cæsarea, Palestine, where the study of eloquence flourished. He afterward visited the schools of Alexandria, and then of Athens, where he met Basil the Great, then also a young student, and became his intimate friend. At the same time, there studied at Athens, Julian, later the Roman emperor and 'apostate;' and there is no doubt that the three often met and had friendly discussions on their common studies; though Gregory even at that time, augured no good for Julian, who showed signs of an 'unsettled and arrogant mind.' Gregory having made brilliant progress in eloquence, philosophy, and sacred literature, returned to Nazianzus, and received baptism at the hands of his own father, consecrating to God, at the same time, all 'his goods, his glory, his health, his tongue, and his talents;' and in order to be still more able to pursue a life of austere devotion, he retired into solitude, and took up his abode with Basil in the desert near the river Iris, in Pontus. Recalled by his father, Gregory was ordained priest, and afterward fled; and being recalled a second time, he returned to Nazianzus, assisted his father in the ministry, and preached to the people. In 371 or 2, St. Basil, who in the meantime had become bp. of Cæsarea, prevailed on him to accept the

see of Sasime, a small town in Cappadocia. But he had scarcely entered on his new duty, when, overcome again by his innate repugnance to public life, he retired, a bishop without a bishopric, to Nazianzus, where he stayed until the death of his father, 373. He then went into a monastery at Seleucia, which, after the death of Emperor Valens (378), he was induced to leave, in order to undertake the charge of a small Nicæan congregation in Constantinople, where, until then, Arianism had held undisputed sway. Gregory was after a short time, when his erudition and eloquence became conspicuous, elected archbishop, upon which the Arians became so exasperated that his very life was in danger. He had wonderfully advanced the orthodox cause in the capital, and had built up a great and powerful church by his eloquence and zeal. His five discourses on the Trinity are famous; yet he was not chiefly a theological disputant, and not at all a heresy-hunter, but magnified rather the spirit of Christian love. Gregory though upheld by Pope Damasus and Emperor Theodosius, preferred resigning his see voluntarily, 'in order to lay the storm, like another Jonah, though he had not excited it.' He went back to Nazianzus, and took up his solitary abode near Arianzus, where, after years of a most ascetic life, he died. His ashes were conveyed to Constantinople, and thence, during the crusades, to Rome. His day is, with the Latins, May 9; with the Greek Church, Jan. 25 and 30. His character and temper, ardent and enthusiastic, but at the same time dreamy and melancholy, hard, but also tender, ambitious and yet humble; all his instability and vacillation between a life of contemplation and of action, are vividly depicted in his writings, which mostly serve one great aim of his life in Constantinople—to uphold the integrity of the Nicæan orthodoxy against the heresies of the Arians and Apollinarists. The merits of his writings—which vividly portray the instability and vacillation of his life—are very unequal; sometimes not inferior to the sublimest flights of poetical genius, and withal of a classical elegance and refinement, they at other times become redundant, pedantic, and heavy with far-fetched similes. On the whole Gregory may fairly be pronounced one of the first orators, and most accomplished and thoughtful writers of all times. His surviving works consist chiefly of about 53 orations, 242 letters, and 156 poems —meditations, descriptions, acrostics, epigrams, etc. —to which Tollius (Utrecht 1696) added 20, which he called *Carmina Cygnea*. Muratori published (Padua 1709) 228 other unedited epigrams. The first edition of his complete works appeared at Basel, 1550, folio. Another edition appeared Paris, 1609–11 (2 vols. folio), by Morel; reprinted Paris, 1630; Leipsic (rather Cologne), 1690, and Venice, 1753; but none of these is sufficiently accurate. The last edition, but little improved, under the auspices of the Benedictines, appeared

in 2 vols. (Paris 1760–1840). His separate works have frequently been edited, and partly translated into different tongues.

GREGORY THAUMATURGUS, *thaw-ma-tėr'gŭs* (Wonder-worker), SAINT (originally called Theodorus): b. at Neocæsarea, in Pontus, between 210 and 215; d. prob. in the reign of Aurelian, abt. 270. Sprung from an illustrious and wealthy heathen family, he was educated for a rhetorician or advocate; but an acquaintance which he formed with Origen at Cæsarea, in Palestine, allured him to sacred science, and he applied himself under his new master, with zeal and fervor to the study of the Holy Scriptures and of profane philosophy. Several years had thus passed, when Maximin's persecutions forced Origen to leave Cæsarea. Gregory then went to Alexandria (235–238). Gordian having succeeded Maximin, Origen returned to Cæsarea, and Gregory went to join him there, and to renew his former studies. Probably it was at that period that he was baptized, and changed his heathen name of Theodorus. Recalled to his family, Gregory, instead of striving for those posts of honor for which he had been intended, retired into solitude; but was so often besought to return and labor for the church, that he allowed himself to be consecrated, about 240, as bishop at Neocæsarea, a wealthy and populous, but utterly unchristian city, Gregory labored with the utmost zeal. He wrought, according to Gregory of Nyssa and Basil the Great, many startling miracles; and thus contrived to change the unbelieving population of his see into devout Christians. It is certain that he had wonderful success in his 30 years episcopate, converting almost the whole city; but nothing related by the writers above named of his miracles approaches the amazing narratives of them in the *Martyrologus*, or even in the *Breviarium Romanum*.

During the persecution of Decius, which broke out 250, Gregory fled with a great part of his flock, whom he would not see exposed to the danger of having either to change their faith, or to die the death of martyrs; and during this flight (it is narrated) he, when once hard pressed by his pursuers, transformed himself and his deacon—a heathen priest whom he had converted—into trees. In 251, Emperor Decius died, and Gregory returned to Neocæsarea, and instituted a general festival for those Christians who had fallen during the persecution, and permitted the faithful to celebrate it with banquets and sports like those which accompanied heathen festivals—a proceeding by which he sought to draw over the pagan multitude to Christianity, but which has been severely blamed, and which, indeed, was fraught with great mischief for the church in later times. In 264, he was with his brother Anthenodorus, at the Council of Antioch, which had been convoked to condemn the heresies of Paul, Bishop of Samosata; the signatures of the two brothers occur first in the Acts

of the Council. Whether or not Gregory took part in the second council (269), necessitated by Paul's refusal to abdicate, is uncertain. Of his own extraordinary piety, devotion, truthfulness, and modesty, of his 'prophetic and apostolic temper', the best testimony lies in the fact that St. Basil, St. Maximus, and other great luminaries of the church, call him a second Moses or Paul.

The only genuine works of Gregory are a panegyrical discourse on Origen, which he delivered in public before his return to his native place; the above mentioned creed; a Metaphrasis on Ecclesiastes (often wrongly attributed to Gregory Nazianzen) in 12 chapters; and a Canonical Epistle, setting forth the punishments and penances to be undergone by such Christians as had bought booty from pagan soldiers, a practice common in those times of constant invasions of Goths and Scythians in Asia, principally in Pontus. All other writings shown under his name are spurious. The first collected edition of his works was published by Ger. Vossius, Mayence 1604; more complete editions appeared in Paris 1622, 1788.

GRELLET, *grĕl-lĕt'*, STEPHEN: 1773, Nov. 2—1855, Nov. 16; b. Limoges, France: missionary. He was of noble descent, reared a Rom. Cath., and educated at the milit. college at Lyons. In 1790 he entered the body-guard of Louis XVI., and during the Revolution the family estates were confiscated and he and his brothers made prisoners of war and condemned to be shot. He escaped to Demerara after the execution of the king, came to the United States 1795, and joining the Soc. of Friends, spent several years in mercantile business, and engaged in missionary work 1800. He travelled extensively through the southern and New England states and Canada 1800–7, France 1807, England and Germany 1812, Hayti 1816, Norway, Sweden, Russia, Greece, and Italy 1818–20, the United States 1820–31, and Europe 1831–34, everywhere preaching to large audiences, and at one time before Pope Pius VII. He died in Burlington, N. J.

GRENADA, *grĕn-â'da:* island of volcanic origin in the British W. Indies, most southern and said to be the most beautiful of the Caribbees: area 133 sq. m.; abt. 60 m. from the nearest point of S. America. Considerable importations of coolies have taken place. On the coast are several good harbors. A central ridge of mountains, here and there presenting an elevation of 3,000 ft., shows various extinct craters, some transformed into considerable lakes. There are hot springs in Grenada; earthquakes are sometimes felt, and the average temperature is 82° F. The chief towns are St. George, St. Mark, St. Patrick, St. Andrew, and Charlotte-Town. St. George is the cap., pop. about 5,000. Grenada formerly had a house of assembly, but is now a crown

CATHEDRAL OF CORDOVA, GRENADA.

colony under the general govt. of the Windward Islands, Among the exports are sugar, rum, and cocoa; the last of which seems likely to become the staple. Cotton and tobacco are not now cultivated. The island was discovered by Columbus on his third voyage 1498, at which time it was inhabited by Caribs, who were subsequently exterminated by the French, into whose hands Grenada came about the middle of the 17th c. It finally fell into the possession of the British 1783. Pop. (1901) 64,288.

GRENADE, n. *grĕ-nād'* [F. *grenade*, a pomegranate, a ball of wild-fire made like a pomegranate—from Prov. *granada*—from L. *granātum*, a pomegranate]: a hollow ball of iron or annealed glass, abt. 3 inches in diameter, filled with powder, and thrown from the hand. The discharge is effected by means of a small time-fuze. Hurled among dense masses of troops, as those assembled in the ditch of a fortress during an assault, grenades are particularly embarrassing, the splinters inflicting deep wounds and causing great confusion. Grenades are occasionally rolled over the parapet, through wooden troughs, into the trench below: there is also a species of hand-gun fired from a rest, called 'musketon,' from which grenades may be projected to a short distance. These missiles are said to have been used first in 1594. GRENADIER, n. *grĕn'ă-dēr'* [F.]: originally a soldier employed in throwing hand-grenades; but in modern parlance a member of the first company of every battalion of foot, in which the tallest and finest men of the regiment are placed. This company used to be distinguished from the rest by tall bearskin caps; it holds the place of honor, viz., the right, when in line, and the front when in column of attack. Now usually applied in Britain to the grenadier guards. GRENADIER GUARDS, the first regiment of foot guards in the British household brigade of guards, generally considered the finest corps in the army. It comprises 2,540 officers and men, in three battalions. The officers of this fashionable corps are usually from the families of the nobility or more distinguished landed gentry. The first foot guards, under which name the regiment was originally known, was raised in 1660; since then it has ever borne an honorable part in all the wars of the country, especially in the Peninsula, at Waterloo, and in the Crimea.

GRENADILLO, n. *grĕn-a-dĭl'ō:* in *bot.*, cabinet wood from the W. Indies; called also Grenada cocos, and red ebony. It resembles the common cocoa.

GRENADINE, n. *grĕn'ă-dēn:* a thin strong stuff for ladies' dresses, shawls, etc., similar to barège, made of wool, but now to a considerable extent made of silk.

GRENADINES, *grĕn-a-dēnz':* chain of islets in the W. Indies, between Grenada (q.v.), on which they are chiefly dependent, and St. Vincent; lat. 12° 30′—13° n. They vary in size, the largest, Carriacon (pop. 3,071),

being about 7,000 acres. Much inconvenience is caused by their deficiency in streams and springs, an evil which, of late years, has been increasingly felt, from the injudicious destruction of the timber.

GRENELLE, *grĕh-nĕl:* suburb of Paris (q.v.).

GRENOBLE, *grĕh-nō'bl* (corruption of the Lat. *Gratianopolis,* or city of Gratian): important town and strong fortress of France, with double inclosures, cap. of the dept. of Isère, pleasantly situated on both banks of the river of that name, in a beautiful and fertile district, surrounded by high mountains, about 58 m. s.e. of Lyon. It is divided by the Isère, is here confined within handsome quays, into two unequal portions: one, narrow, consisting of only two streets, on the right bank of the river at the foot of a hill, is called St. Laurent; the other, much more important, containing all the public buildings, and consisting of spacious and well-lighted streets, on the left bank, is called Bonne. Among the public buildings are the Palais de Justice, with a Gothic oriel, originally the palace of the Dauphin, and the most interesting old building in the town; the Académie Universitaire; the town-hall; the public library, containing 100,000 vols. and 1,500 MSS.; and the picture-gallery. Grenoble has gained repute for its manufactures of gloves (in making which more than 20,000 persons are employed at more than 100 factories), leather goods, watches, liqueurs, perfumes, chemicals, and silk. There is besides a brisk trade in hemp, iron, wood, and cheese. Grenoble, originally a city of the Allobroges, was fortified by the Romans. It was Burgundian in the 5th century, and later belonged to Dauphiné. Pop. (1901) 68,615.

GRENVILLE, *grĕn'vĭl,* GEORGE: English statesman, reputed author of the Stamp Act, which first drove the American colonies into resistance: 1712, Oct. 14—1770, Nov. 13; brother of Richard Grenville, Lord Temple, and brother-in-law of the Earl of Chatham. He entered parliament 1741, and 1744–62, filled several minor govt. offices. In 1757 he introduced a bill for the regulation of the payment of the navy. In 1762 he became sec. of state, and then first lord of the admiralty; and in the following year he succeeded Lord Bute as prime minister, uniting in himself the offices of chancellor of the exchequer and first lord of the treasury. He resigned the premiership 1765, and died 1770. Grenville was exemplary in private life, and distinguished for public spirit, business qualities, and knowledge of parliamentary forms; but he was of narrow political vision, and utterly lacking in tact; and his imperious nature made him unpopular, alike with the king, the parliament, and the people.

GRENVILLE (or GREEN'VILLE, or GRAN'VILLE), Sir RICHARD: 1540–91; b. England: admiral. He was a cousin of Sir Walter Raleigh, entered the German army

and fought against the Turks 1556, received a milit. appointment in Ireland where he became sheriff of Cork, was elected member of parliament 1571 and knighted by Queen Elizabeth. Co-operating with Sir Walter Raleigh in his attempts to plant colonies in America, he commanded the fleet of 7 vessels which landed 108 colonists at Wocoken, N. C., 1585, June 26 In 1588 he was appointed a member of the council to devise means of defense against the Spanish Armada (see ARMADA), and for his services during that great naval movement was made vice-admiral 1591, and the same year off the Azores, with only 5 ships, fought a Spanish fleet of 53 vessels, beat them off 15 times, sank 4, and after being fatally wounded was forced to surrender. All English historians have greatly extolled his skill and courage on this occasion, but none have given the month nor day of the battle.

GRENVILLE, WILLIAM WYNDHAM, Lord: 1759, Oct. 25—1834, Jan. 12; third son of George Grenville. After studying at Eton and Oxford with brilliant success, he became a member of the house of commons 1782, and attended his eldest brother, lord lieut. of Ireland, as secretary. Soon afterward, he became paymaster-gen. of the army, and 1789 was chosen speaker of the house of commons. In 1790 he was appointed sec. of state for the home dept. and was raised to the peerage with the title Baron Grenville. He became foreign sec. 1791. He resigned office, with Pitt, 1801, on the refusal of George III. to give his assent to the Rom. Catholic Emancipation Bill. He was premier, 1806–7. In 1809 he was chosen chancellor of the Univ. of Oxford. 1809–15 he acted with Earl Grey, and he generally supported Canning. Lord Grenville was an able speaker, with much influence among the peers, and an excellent scholar.

GRESHAM, *grĕsh'am*, Sir THOMAS: founder of the London Royal Exchange: 1519–1579, Nov. 21; second son of Richard Gresham, an opulent merchant who was elected 1537 lord mayor of London; descended from an ancient Norfolk family. He was apprenticed to his uncle, Sir John Gresham, a wealthy London mercer, and then sent to study at Gonville Hall, now Caius College, Cambridge. In 1543, he was admitted a member of the Mercers' Company. In 1552, Gresham was sent to Antwerp, as king's factor there, in consequence of the mismanagement of the person previously in charge. In two years he paid off a heavy loan, entirely restored the king's credit, and introduced a new system of finance. The principal duty of the royal agent, negotiation of foreign loans, was discharged by Gresham with great fidelity and success. As he was a Protestant, Queen Mary, on her accession, sent him his dismissal; but on presenting a memorial of his past services, he was soon reinstated. By Queen Elizabeth, 1559, he was knighted, and appointed for a

short time, English ambassador at the court of the king of Spain's regent at Brussels. The troubles in the Netherlands compelled him to withdraw finally from Antwerp, to which city he had made more than forty journeys on the service of the state, in one of which, 1560, he was thrown from his horse, and rendered lame for life. In 1569, by his advice, the plan of borrowing money from the London merchants, instead of from foreigners, was adopted, to the great advantage of the mercantile body. Having lost his only son, Richard Gresham, 1564, he resolved upon devoting a portion of his great wealth to the erection of a bourse or exchange, in imitation of the one at Antwerp, for the London merchants, who were wont to meet in the open air—a project which originated with his father. It was formally opened, 1570, by Queen Elizabeth in person, on which occasion she dined with the founder, and named it the Royal Exchange. Renowned for his hospitality and liberality, he frequently entertained foreign personages of distinction, and erected a magnificent mansion at Osterly Park, near Brentford, where he was visited by Queen Elizabeth. For the endowment of a college in London, he directed by his will that his town-mansion in Bishopsgate street should be converted into a residence and lecture-rooms for seven professors, to be salaried out of the Royal Exchange revenues. Gresham College was taken down 1768, and the ground on which it stood was transferred to government. The lectures were delivered in a room in the Exchange till 1843, when the lecture-hall at the corner of Gresham street was built out of the accumulated fund. The subjects of lecture are divinity, physic, astronomy, geometry, law, rhetoric, and music. Gresham also provided for the erection and support of eight almshouses, and made many other charitable bequests.

GRESHAM, Walter Quinton: lawyer: 1832, Mar. 17—1895, May 28; b. Corydon, Ind. He received a univ. education, but was not graduated; was admitted to the bar 1853; elected to legislature 1861; resigned to become lieut.col. 38th Ind. vols., and was afterward col. 53d Ind. vols.; was promoted brig.gen. of vols. for services at Vicksburg 1863, and was brevetted maj.-gen. of vols. 1865 for gallantry before Atlanta. He resumed law-practice in New Albany, Ind.; was appointed U. S. judge for the dist. of Ind. 1869; became postmaster-gen. in Pres. Arthur's cabinet 1882, sec. of the treas. 1884, and U. S. judge of the 7th judicial circuit 1884. In 1892 he declined nomination as presidential candidate of the People's party, giving his support to the democratic principles as represented by Mr. Cleveland, and on the accession of the latter to the presidency 1893, Gresham was appointed sec. of state. He was noted for independence of character and for strong will.

GRESSORIAL, a. *grĕs-sō′rĭ-ăl* [L. *gressus*, a stepping

or step]: applied to the feet of birds which have three toes forward, two of them connected, and one behind.

GRETNA GREEN, *grĕt-nă grēn:* name originally of a farmstead in the vicinity of the village of Springfield, parish of Graitney, Dumfriesshire, Scotland, but frequently applied to the village of Springfield itself, about a mile and a half n. of the n.e. extremity of the Solway Firth. The village was long the centre of extensive smuggling operations, and more recently it became famous (or infamous) for its irregular marriages.

GRET'NA GREEN MAR'RIAGES: the name given to marriages of English persons in Scotland, contracted mostly at Gretna Green (q.v.), the first convenient halting-place for runaway couples from England. This kind of marriage was originally an easy mode of evading the English Marriage Act, which required the consent of parents and guardians, publication of banns, and the presence of a priest—all involving considerable publicity and delay. The rule being, that a marriage is valid if contracted according to the law of the place where the parties enter into the contract, it was easy for English couples to avail themselves of the law of Scotland, which required nothing but a mutual declaration of marriage to be exchanged in presence of witnesses, and did not prohibit the marriage of minors. This declaration generally took place in presence of a blacksmith, who really was no more necessary than any other witness, but who gradually assumed a sort of authority. The parties could return at once to England and their marriage was ever after held valid there and all the world over. These marriages have been much checked of late. Not only has the strictness of the English law been relaxed by allowing marriages to be contracted in England in comparative secrecy before the superintendent registrar, without going before a priest, but also the Scotch law has been altered. No irregular marriage of that kind in Scotland is now valid unless one of the parties had at the date thereof his or her usual place of residence there, or had lived in Scotland 21 days next preceding.

GRÉTRY, *grā-tre'*, André Ernest Modiste: 1741, Feb. 8,—1813, Sep. 24; b. Liége, Belgium: musical composer. He entered the choir of the cathedral at Liége when 6 years old, received instruction from local musicians, composed a mass and dedicated it to the canons of the cathedral 1759, and was sent by them to study in the Collége de Liége at Rome. He studied there 5 years, completed his musical education with Caseli, and achieved his first success as a composer by the operetta *Le Vendemiatrici*, produced at the Aliberti Theatre in Rome. Early in 1767 he went to Paris, and thenceforth applied himself to French comic opera, composing *Le Huron* 1768, then *Lucile* and *Le Tableau*

Parlant, Zémire et Azor 1771, *Richard Cœur de Lion* 1784, *Barbe-Bleue, Guillaume Tell, La Rosière Républicaine, La Fête de la Raison,* and nearly 50 other operas, serious and comic. He is esteemed one of the founders of French comic opera.

GREUZE, *grŭz,* JEAN BAPTISTE: 1725, Aug. 21—1805, Mar. 4; b. Tournus near Macon: French genre painter. He studied painting at Lyons and Paris, attracted notice by his earliest pictures, *A Father Explaining the Bible to His Family,* and *The Blind Man Cheated,* and was admitted by the Acad. 1755. He visited Rome, and desiring to rank as a historical painter, chose classical subjects, in which he failed, and ultimately returned to his former style of genre, *The Girl Crying over Her Dead Bird, The Good Mother, The Bad Boy Punished,* and the like. He died at Paris, in great poverty due to his own improvidence. Greuze was a fine colorist, but great success was due mainly to his choice of subjects. At the Pourtalis sale 1865, his *La Jeune Fille à l'Agneau,* was sold for 1,000,200 francs, nearly $200,000. He represented a reaction against the artificiality of the age, and a return to nature, though he himself was still hamperel by the 18th c. spirit.

GREVILLE, *grĕv'il,* CHARLES CAVENDISH FULKE: historian: 1794, Apr. 2—1865, Jan. 18; b. London; great grandson of the 5th Earl of Warwick, and grandson of the Duke of Portland. He was a page to George III., was educated at Eton and Christ Church, Oxford, but left before graduation on being appointed private sec. to the Earl of Bathurst, and was appointed sec. of the island of Jamaica with a deputy to perform the work. In 1821 he became clerk of the privy council in ordinary, and held the office till 1860, thus serving under three sovereigns, George IV., William IV., and Victoria. He led the life of a man of fashion, was welcomed into the highest political and social circles, was an early member of the Jockey Club, a patron of the turf, and owner of several of the most noted horses ever bred in England, and was on terms of utmost familiarity with George IV. He was for a time sec. to the board of trade and plantations, and 1845 published a book, *Past and Present Policy of England toward Ireland,* in which he advocated the relief of the Rom. Catholics by the payment of their clergy. His fame chiefly rests on the posthumous publication of a portion of his diary, in which he recorded his impressions on the people, ceremonies, and events of his time. A part of these records covering the period 1820–37 was published under the title *Journal of the Reigns of George IV. and William IV.* (1874), and aroused much interest.

GRÉVY, *grā-vē',* FRANÇOIS PAUL JULES, Ex-President of the French Republic: b. 1813, Aug. 15, at Vaudrez in the Jura; d. 1891, Sep. 9. He studied law, and became an advocate at Paris. He took part in the revo-

lution of 1830, and 1848 was returned to the constituent assembly. There he held an independent position, but was generally ranked with the extreme left. After Louis Napoleon's *coup d'état* Grévy withdrew from politics, and applied himself to his professional work. He returned to political life 1868. After the Franco-German war he was appointed pres. of the national assembly; he resigned 1873; and after the general election 1876, he again became pres. of the chamber. When, 1879, Jan., Marshal MacMahon resigned the presidency of the rep. Grévy, who was a thorough but not extreme republican, was by large majority elected his successor. Grévy had never been a blind partisan, and he had the respect and confidence of all parties, until the strange and unfortunate complication of his name with some scandalous proceedings of his son-in-law, Wilson, who was adjudged guilty of the sales of offices and distinctions for money. No charge of guilty knowledge of these acts was made against Grévy; but the scandal was so great and so near his person that his resignation of his exalted office was compulsory under popular indignation, 1887, Dec. 3.

GREW, *grô:* pt. of GROW, which see.

GREW, *grū*, MARY: reformer: b. Conn., 1813: daughter of the Rev. Henry Grew (Bapt). She was educated in Catherine E. Beecher's young ladies' seminary in Hartford, received a special training in metaphysics, and became a skilful logician, popular speaker, forcible writer, and effective anti-slavery advocate. She removed to Philadelphia 1834, and entered the ministry of the Unitarian Church. Her great work, beginning almost in childhood, was in behalf of the colored people, free and slave. She was corresponding sec. of the Philadelphia Anti-slavery Soc. for about 30 years, and during that period prepared annual reports which attracted wide attention. She also was editor for a long time of the *Pennsylvanian Freeman*, the organ of the Philadelphia society.

GREWIA, *grô'ĭ-a* [named from Nehemiah Grew (1628–1711), earliest vegetable anatomist and physiologist of England]: genus of trees of nat. ord. *Tiliaceæ*, having simple and more or less ovate leaves, and a drupaceous fruit. They are African and Asiatic, mostly tropical and subtropical. The bast of some species and the wood of others are valuable; and the leaves of others are given as fodder to cattle.

GREY, a. *grā:* another spelling of GRAY, which see. GREY-BEARD, a contemptuous name for an old man. GREY-HEADED, having the hair of the head intermixed with gray hairs, an indication of advancing years. THE GREY MARE IS THE BETTER HORSE, the wife rules the husband. THE GREYS, or SCOTS GREYS, a British cavalry regiment, so named because mounted on gray horses. GREYSTONE, a. grayish granular rock of volcanic origin.

GREY- or GRAY-FRIARS, Franciscan friars, so named from the color of their habit (see FRIAR). GREY-POWDER, a. combination of chalk and mercury, much used as a medicine. GREY-WETHERS, the weather-worn and half-rounded blocks of gray sandstone which are scattered over the surface of the lower Downs and other districts in the s. of Eng.; also known as *Sarsen* or *Druid stone.*

GREY, ALBERT HENRY GEORGE, Fourth Earl, English statesman: b. Howick, Northumberland, England, 1851, Nov. 28. His grandfather, the second earl, was prime minister of England, and influential in securing the passage of the Reform Bill of 1832. The present earl was graduated from Trinity College, Cambridge; in 1880 he was elected to Parliament, as a Liberal, and supported Gladstone in the House until 1886 when the Liberals declared in favor of home rule. He then became a Liberal Unionist, but lost his seat in Parliament. In 1894, as his uncle died childless, he succeeded to the estate and title, and entered the House of Lords. He was a personal friend of Cecil Rhodes, was one of the promoters of the South African Company, and in 1896–97 served as governor of Rhodesia. As an executor of the Rhodes will, he is now one of the trustees of the scholarship fund. He has been an active worker in reform movements, especially in the cause of co-operation and of temperance. On his estate he has organized a co-operative system which has worked successfully; and in 1901 he organized a system for the management of public houses in the interests of the public, known as the public House Trust. In 1904 he was appointed governor-general of Canada to succeed the Earl of Minto.

GREY, *grā*, CHARLES, Earl, K.G.: British statesman, head of the govt. which carried the Reform Bill: 1764, Mar. 13—1845, July 17; b. Fallodon, near Alnwick; son of the first earl (Gen. Sir Charles Grey, K.B.), distinguished soldier who held commands in the war against the American colonies, and in the war against the French republic. The Greys are a Northumberland family of great antiquity, celebrated for military achievements, and ennobled in the time of Edward IV. Young Grey was sent to Eton, thence to Cambridge, then visited the continent; and in his 22d year entered the house of commons as M.P. for his native county. He became a follower of Fox, and his maiden speech was in opposition to the address of thanks to the king for negotiating the commercial treaty with France. He soon obtained a leading position in the house of commons, and was one of the managers of the impeachment of Warren Hastings. He was also one of the founders of the Society of Friends of the People, afterward suppressed as unworthy in its spirit and dangerous in methods. In 1793, he was selected to present a petition from this society, in which the defects and abuses of the repre-

sentative system were forcibly exposed. He was outvoted on this occasion, and again 1797; and seems soon to have recognized his effort in furthering the aims of the society, as a mistake due to inexperience. In 1799, he opposed the proposal for the Irish union, but recommended the abolition of 40 rotten boroughs in Ireland as a means of securing the independence of Irish members. When the whig administration of Lord Grenville came into office 1806, Grey, now Lord Howick, became first lord of the admiralty. Fox died in Sep., and was succeeded by Grey as sec. of state for foreign affairs, and leader of the house of commons. The cabinet was broken up 1807, but not before it had carried the abolition of the slave trade, and the enlistment of soldiers for a limited period instead of for life. It was unfortunate, both for Grey and the whigs, that he was, by the decease of his father 1807, removed from the house of commons, where he might have led the opposition, to the upper house, where his advocacy of measures of progress and amendment found little response. Grey and Lord Grenville, as the leaders of the whig opposition, were more than once urged by the Prince of Wales, after he became regent, to coalesce with the tory ministry, but these overtures were firmly rejected. Grey actively opposed the bill of Pains and Penalties against Queen Caroline. During the long period in which he remained in opposition, 1807–30, he gave strenuous support to the abolition of religious tests, removal of Rom. Cath. disabilities, and amelioration of the criminal code. The year 1830 was a period of great political disorder and discontent. The French Revolution had familiarized the bolder and more ardent spirits with the idea of resistance to the government. Nightly conflagrations in the agricultural districts alarmed the timid. Many extreme partisans on both sides were ready for civil war. When parliament met in Nov. Grey gave warning of the approaching hurricane, and again urged the adoption of measures of temperate reform. It was in answer to this speech that the Duke of Wellington made his memorable declaration against reform, and expressed his admiration of the existing system of representation. This was the death-blow to the Duke's government. Being outvoted on a motion of Sir H. Parnell's on the Civil List, the cabinet resigned, and William IV. sent for Grey, who formed a whig govt., of which he was premier. The whigs set to work in earnest to clear away the gross abuses and nests of corruption which had accumulated during nearly 70 years of toryism; above all, a great, comprehensive, and searching measure of parliamentary reform was prepared by a sub-committee of the cabinet, consisting of Lord J. Russell, Lord Durham, Lord Duncannon, and Sir J. Graham. The bill was brought into the house of commons 1831, Mar. 1, by Lord J. Russell, and electrified the nation. It was, however, fiercely

opposed in both houses. General Gascoyne carried a resolution against reducing the number of M.P's. Grey thereupon advised the king to dissolve parliament. 'The bill, the whole bill, and nothing but the bill,' was the watchword at the elections; and when the new parliament met the bill was carried through the lower house by large majorities. The second reading was moved by Grey in the house of lords, 1831, Oct. 3: after five nights, the bill was thrown out by 199 votes against 158. The reply of the house of commons was an immediate vote of confidence in the ministers. The king prorogued parliament, in order that, after the shortest possible interval, the bill might be again introduced. Riots took place at Nottingham, Derby, and Bristol. At Birmingham, 150,000 men threatened to march upon London. The metropolis was in a fever of excitement. A second Reform Bill passed the house of commons, which also passed a second reading in the house of lords, the tories being determined to mutilate it in committee. Lord Lyndhurst moved the postponement of the disfranchising clauses, and the whigs being beaten, Grey, with Brougham, resorted to the extreme remedy of demanding from the king a new and large creation of peers. The king refused his consent, and Grey resigned. The popular excitement increased. The king sent for the Duke of Wellington, but Sir Robert Peel refusing to join the duke in the attempt to form a government, Grey, again sent for by the king, consented to form a govt. only on condition that enough new peers should be created to ensure the passing of the bill by the lords. The chancellor, Lord Brougham, joined in the demand, to which the king at last reluctantly assented,—putting his assent in writing, on Brougham's shrewd request. From the date of this memorable writing by William, 1832, May 17, the house of peers has been recognized as lacking power to stand against a responsible government by the ministry supported by the commons. Grey returned to office, armed with this new power, which, if he had used it by the creation of 60 new peers, would, as has been remarked, 'have been equivalent to the abolition of the house.' The power was not exercised. The mere concession of it sufficed to lead a sufficient number of peers to absent themselves, and the Reform Bill was carried 1832, June 4, in the house of lords by a majority of 84. Thus Grey, who had seemed in 1827 the mere relic of the extinct whig party, stood forth in 1832 at the head of that party not only revived but supreme in parliament and with the people. Grey took office on the principles of peace, retrenchment, and reform. His govt., however, lost much of its popularity in England by his deference to the hostility of the lords, and his attempt to conciliate his opponents by a division of patronage. In Ireland, Stanley's quarrels with O'Connell and the Irish repealers also tended to weaken the government. Many important measures, however, were passed—the meas-

ure for national education in Ireland, the Irish Church Temporalities Bill, and the bill for abolishing slavery in the W. Indies. In 1834, Dec., the Grey ministry fell to pieces on the Irish Coercion Act. Grey retired from the post of first lord of the treasury with the respect and esteem of the entire nation. A more honorable man never existed. A moral dignity stamped his every action, and over his truthfulness no cloud ever passed. He passed the last ten years of his life in comparative retirement, and died at his family mansion, Howick House. His personal appearance was stately and dignified, his gestures were animated, and his tones lofty and sonorous. He left eight sons and four daughters.

GREY, Sir GEORGE, K.C.B., governor and commander-in-chief of New Zealand: b. Lisburn, Ireland, 1812; d. London, England, 1898, Sept. 19. He was educated at the Royal Military College at Sandhurst, attained a captaincy, and started 1837 to explore the interior of Australia, then little known. In 1838, Sep. he organized another expedition to explore the Swan river district. In 1841, he received the unasked position of governor of S. Australia. In 1846, he was made gov. of New Zealand. In 1854, he was appointed gov. and commander-in-chief of the Cape of Good Hope. The task of allaying the asperities and irritation left by the Kafir war he fulfilled with high statesmanship. In 1858, he gave up his post through a disagreement with the colonial office, but was requested by the govt. to resume his governorship. In 1861, he was again appointed gov. of New Zealand; the natives received him with joy, and he succeeded in bringing about pacific relations with the Maories. He resigned, and returned to England 1867, but later again went to New Zealand and from 1877–91 was premier of the colony. In 1895 he resigned his seat in the New Zealand parliament and returned to England. Grey wrote *Journals of Discovery in Australia* (1841); *Polynesian Mythology* (1855); *Proverbial Sayings of the Ancestors of the New Zealand Race* (1858).

GREY, Lady JANE: English woman of royal birth and singular misfortunes: abt. 1537–1554, Feb. 12; b. Broadgate, Leicestershire; eldest daughter of Henry Grey, Marquis of Dorset, afterward Duke of Suffolk, and Lady Frances Brandon. Lady Frances was daughter of Charles Brandon, Duke of Suffolk, and of Mary, sister of Henry VIII., who had been married to Louis XII. of France, but had become a widow. Lady Jane Grey was thus great-granddaughter of Henry VII. Having at an early age showed surprising talents, she was furnished with an excellent tutor, Aylmer, afterward bp. of London, and under his care made extraordinary progress in arts and sciences, and particularly in languages, being able to speak and write Latin and Greek, as well as French and Italian. She was the marvel of the age for learning, finding in study a refuge from the harshness

and severe discipline of her domestic life in her father's house. We have the testimony of Roger Ascham, that he found her reading the *Phædon* of Plato in Greek, while the rest of the family were engaged in hunting. She also sang and played well, and was versed in other feminine accomplishments.

In 1553, after the fall of Somerset, the Dukes of Suffolk and Northumberland, ruling in the name of the youthful and invalid King Edward VI., and foreseeing his speedy death, determined to change the succession to the crown, and secure it to their own families. Lady Jane Grey, then 16 years old, was therefore married to Lord Guilford Dudley, fourth son of the Duke of Northumberland, 1553, May. The king, failing in body, and weak in mind, and surrounded by selfish or fanatical advisers, was persuaded to make a deed of settlement, setting aside the right of succession of his sisters Mary and Elizabeth, and Mary Queen of Scots, leaving the crown to Lady Jane, who was innocent of the conspiracy. After the king's death, her ambitious relatives hailed her as 'queen.' Lady Jane at first shrank from honor so treacherously won, but ultimately yielded to their entreaties and demands, and allowed herself to be proclaimed queen. The people of England resented the unscrupulous conduct of Suffolk and Northumberland; and though Lady Jane was known to be learned, brilliant, and amiable, they rallied with the true English instinct of loyalty round Mary, who had retired to Norfolk, where adherents were gathering to her. Northumberland, who moved thither with an army, was defeated, sent to the tower, and beheaded 1553, Aug. 22; and 1554, Nov., Lady J. and her husband were condemned. For a while, Mary hesitated to pronounce sentence of death against the young couple, but at length she issued the fatal warrant Feb. 8, which was executed in the case of both four days afterward. Lady Jane reigned only ten days. She met her fate with Christian firmness, making a brief address, in which she confessed the justice of her sentence; but said: 'I only consented to the thing I was forced into.' Several epistles and other writings attributed to her are extant.

GREYHOUND, or GRAYHOUND, n. *grā'hownd* [Icel. *grey-hundr;* Fr. *grey*, dog, *hundr*, hound; *Scot.* grey, badger]: kind of dog distinguished by great slenderness of form, length of limbs, elongation of muzzle, swiftness, and power of endurance in running. There are varieties differing in less important characters, but these are common to all. They have also prominent eyes and very keen sight, but their scent is not acute, and they pursue their prey not by the scent, like the hounds (q.v.) properly so called, but by keeping it in view. Some varieties, however, as the *Scottish G.*, probably from being crossed with the staghound or some other of the hounds, combine superior powers of scent with the ordinary qualities of the greyhound. Greyhounds

have the parietal bones convergent, not parallel as in the hounds. The face exhibits an almost straight line from between the ears to the nose. The ears are small and sharp, half pendulous in some varieties; quite erect in some others. The chest is deep; the belly much contracted; the paws are small; the hair is long and rough in some varieties, short and smooth in others; the tail is long and slender, curved up at the tip, and in the common smooth-haired greyhounds of w. Europe, is covered with hair similar to that of the rest of the body; but there are other varieties with a bushy tail. It is probable that the greyhound originally belonged to some of the wide plains of central Asia, or n. Africa; it has been very long employed by man as a hunting-dog; it is figured on the monuments of ancient Egypt, and has been common from earliest historic times in India, Persia, and other countries of Asia, also in Greece, and throughout Europe. Probably it was brought to w. Europe from the east; and old records show that high value was set upon it. It was long employed chiefly in the chase of deer; and on one occasion Queen Elizabeth was entertained with the pleasant spectacle of 'sixteen bucks, all having fayre lawe, pulled down with greyhounds,' which she viewed from a turret at Cowdrey Park, Sussex, the seat of Lord Montacute. The right to possess greyhounds was a proof of gentility; and the effigy of this dog often appears at the feet of monumental figures of knights in armor. The killing of a greyhound, in the good old times, was a felony, punished as severely as murder.

The smooth-haired variety of greyhounds, used in 'coursing' (q.v.), was imported from France, and improved by further importations from Greece, Italy, n. Africa and India. The varieties previously in use were rough-haired, and some of them larger and stronger. The *Irish G.*, now almost or quite extinct, was large and powerful, so that while wolves existed in Ireland, it was used to hunt them. The *Italian G.* is a very small and delicate variety, of gentle manners—a drawing-room pet. Greyhounds generally do not show such strong attachment as other dogs to particular persons; and though so long reduced to the service of man, are inferior to many other dogs in the degree of their domestication. The Grecian and Turkish greyhounds have been trained to stop if a stick is thrown among them when in full pursuit of a doubling hare. A whole pack will thus be stopped, and then one, singled out, will pursue the game. The fleetness of the greyhound is illustrated by an anecdote in Daniel's *Rural Sports*, of a brace of greyhounds in Lincolnshire running after a hare more than four m. in 12 minutes—the increase of distance by turns not being reckoned—when the hare dropped dead.

Various etymologies of the name greyhound have been proposed, one of which refers it to the prevalence of a

gray color in the breeds formerly most common: another derivation is from *Graius*, Grecian. The *gazehound*, mentioned by old writers, is supposed to be the greyhound, the name being probably given when a pure breed, hunting by sight alone, was introduced.

GREYLOCK, *grā'lŏk:* peak of Saddle Mountain in Adams tp., Berkshire co., Mass., locally known as Saddle Ball; highest point of land in Mass.; 3,500 ft. above sea-level. The sides are covered with forests and the summit commands a view of a large stretch of scenery.

GREYTOWN, *grā'town* (properly SAN JUAN DEL NORTE), or SAN JUAN DE NICARAGUA: seaport on the Mosquito coast, Nicaragua, Central America, at mouth of the San Juan river; lat. 10° 55′ n., long. 83° 43′ w. As the chief place in the old Mosquito kingdom, it was occupied by the British 1848, became terminus of the Nicaraguan transit 1853, was bombarded by U. S. war vessels for infringing on the rights of the transit company 1854, and was secured to Nicaragua by treaty with Great Britain after its inhabitants had formed an independent govt. 1860. For several years private and official (naval) American surveying parties have made it the Atlantic terminus of a proposed interoceanic canal. The virtual failure of the French (de Lesseps) Panama canal scheme (1888-9) stimulated American engineers. A bill to incorporate the Maritime Canal Company of Nicaragua passed both houses of congress and was signed by Pres. Cleveland 1889, Feb. 20; and the sec. of the navy granted a year's leave of absence to Commander R. D. Evans, U.S.N., to enable him to superintend the construction. Greytown has a natural harbor of much value which has been almost destroyed by salt deposit from the San Juan river. The restoration of this harbor was considered (1889) the most difficult part of the canal construction, and the U. S. survey allowed $1,767,000 for that purpose. It was proposed to divert the lower San Juan river into the Colorado branch, isolate the harbor, dredge it, and run a break-water 3,000 ft. from the outer line of the harbor into the Carribean Sea with 6 fathoms at its seaward end.

GRIDE, v. *grīd* [Ger. *gerte;* Dan. *gard*, a rod: Bav. *gart*, a switch]: in *OE.*, to pierce or cut; to cut through; to cut harshly or with grating sound. GRI'DING, imp. GRI'DED, pp.: see GIRD 3.

GRIDIRON, n. *grĭd'ĭrn* [W. *greidyll*, a griddle—from *greidio*, to scorch or singe: Ir. *greideal*, a griddle: Gael. *gread*, to burn, to scorch: Sw. *gradda*, to roast]: a grated frame for broiling flesh or fish over a fire; a kind of frame for drawing up a ship on to be docked and repaired. GRIDDLE, n. *grĭd'l* [Scot. *girdle*]: an iron plate to bake cakes on; a bakestone; a sieve with a wire bottom used by miners.

GRIDIRON VALVE: a slide valve on which the

ports are subdivided transversely by narrow bars corresponding to similar subdivisions in the cylinder ports, so as to give the necessary steam-way with a reduced travel of the valve. These valves may be double or treble ported.

GRIDLEY, *grĭd'lĭ*, RICHARD: 1711, Jan. 3—1796, June 20; b. Boston: soldier. He received a milit. education, was chief of the corps of engineers engaged in the reduction of Louisburg 1745, appointed col. in the British army 1755, planned and constructed the fortifications at Lake George, N. Y. (q.v.), took part in the investment and capture of Quebec, and was rewarded with the gift of Magdalen Island and half-pay for life from the British govt. He became chief engineer and chief of artillery in the colonial army 1775, planned the Bunker Hill fortifications and was wounded in the battle, took part in constructing the fortifications at Boston, and was appointed maj.gen. by congress 1775, Sep. 20.

GRIEF, n. *grēf* [F. *grief*, oppression: It. *gravare*, to aggrieve, to oppress—from L. *grăvĭs*, heavy]: pain of mind on account of any trouble past or present, or of fault committed; sorrow; that which afflicts. GRIEF'LESS, a. without grief. GRIEVE, v. *grēv* [from *grief*: OF. *greva*, to grieve]: to cause pain of mind to; to afflict; to hurt; to feel pain in mind; to mourn or lament. GRIEV'ING, imp. GRIEVED, pp. *grēvd*. GRIEV'ER, n. one who. GRIEV'ANCE, n. *-ăns*, that which causes brief or uneasiness; a hardship or wrong. GRIEV'INGLY, ad. *-lĭ*. GRIEV'OUS, a. *-ŭs*, hard to be borne; burdensome; distressing. GRIEV'OUSLY, ad. *-lĭ*. GRIEV'OUSNESS, n. —SYN. of 'grief': affliction; distress, trouble; sadness; trial; grievance: —of 'grievance': hardship; burden; oppression; trouble; injury; affliction; grief;—of 'grieve': to sorrow over; mourn; try; offend; vex.

GRIEFFUL, n. *grēf'fŭl* [see GRIEF]: in *OE.*, full of sorrow or grief; melancholy.

GRIEG, EDVARD, *ĕd'vârd grēg*, Norwegian composer: b. Bergen, 1843, June 15; d. there 1907, Sep. 4. By the advice of Ole Bull, Edvard was sent to the Leipsic Conservatory at the age of 15; he remained there three years, studying with Plaidy, Wenzel, Moscheles, E. F. Richter, Hauptmann, Reinecke. Their lessons, and the music he for the most part heard and studied, impressed a German stamp on his mind, which characterized his first compositions. His studies were interrupted by an illness, a severe case of pleurisy, which destroyed one of his lungs and left his health impaired for life. On his return to the North he came under the influence of three Scandinavian musicians: the composer Gade, who gave him many useful hints; Ole Bull, an ardent musical patriot, who made him familiar with the charming folk-tunes of Norway, which he played so entrancingly; and Richard Nordraak, who encouraged him in his natural inclination to get out of the

maelstrom of German music and steer into the fjords of Norway. From 1866 to 1873 he lived at Christiania, conducting the Philharmonic concerts and giving lessons. He also gave subscription concerts, with the aid of his cousin, Nina Hagerup, whom he married in 1867, June 11; she was an excellent vocalist, whose art was a great aid in winning favor for his songs. In 1868 Liszt accidentally came across Grieg's first violin sonata (Op. 8), and was so much impressed by the evidence of creative power it gave that he invited him to come and spend some time in his studio. It was in consequence of this flattering letter that the Norwegian Government gave Grieg a sum of money which enabled him to visit Rome. There he repeatedly met Liszt, who became more and more impressed by the boldness and the national traits of his genius; he urged him to persevere in his original course and not to let the critics intimidate him.

In 1874 Henrik Ibsen asked Grieg to write the music for a stage version of his *Peer Gynt*. The offer was accepted and the play was produced, with much success, in 1876. It is often given in Scandinavian cities; elsewhere it has not succeeded, because of its untheatrical, fantastic character and its grotesque local coloring; but the music, arranged for the concert hall in the form of two suites, soon made Grieg one of the most popular composers in all countries. In the same year that Ibsen invited him to compose the music for *Peer Gynt*, the Norwegian Government honored him with an annuity of 1600 crowns for life. This relieved him of the drudgery of teaching and enabled him to devote most of his time to composing. For several years he lived at Lofthus, on the Hardanger Fjord. At Bergen, 1880-82, he conducted a musical society called the *Harmonien*. In 1885 he built the elegant villa Troldhaugen, overlooking the fjord, about 8 kilometres from Bergen; there he lived till his death. After his fame was well established, about 1880, he left his home frequently for concert tours in Germany, France, and England. Everywhere he was acclaimed as one of the most individual and enchanting of pianists (he played only his own pieces), and usually all the seats for his concerts were sold long before their dates. Sometimes he conducted his orchestral compositions. In 1899, Colonne invited him to Paris to conduct a Grieg concert; but it was just after the verdict in the Dreyfus case, which had made Grieg so indignant that he refused the invitation. When it was repeated, four years later, he accepted. There was a tremendous crowd; cries of 'apologize, you have insulted France!' were heard; but the vast majority was with him, and the concert proved one of his biggest triumphs.

Grieg did for Norway what Chopin did for Poland, Liszt for Hungary, Dvorák for Bohemia; he created a new national art. This great achievement, unfortu-

nately, stood in the way of the full recognition of his superlative genius. It is still commonly assumed that he did little more than transplant to his garden the wild flowers of Norwegian folk-music, whereas, in truth, ninety-five hundredths of his music is absolutely his own. He ranks with Schubert and Chopin both as a melodist and a harmonist. His persistent ill-health prevented him from writing operas and symphonies; most of his works are songs and short pianoforte pieces. The songs, 125 in number, are of striking originality and depth of feeling. The equally numerous short pieces for piano (including 66 'lyric pieces' in one vol.) are as idiomatic as Chopin's. There are also five sonatas: one for piano alone, three with violin, one with 'cello, besides a string quartet. The orchestral list includes: Overture *In the Autumn; Holberg* suite; 2 *Peer Gynt* suites; *Sigurd Jorsalfar*, arrangements of Grieg's songs and Norwegian dances. Choral works: *At the Cloister Gate; Landsighting; Olaf Trygvason. Bergliot* is a poem for declamation, with orchestra. The only books on Grieg and his works are by Schjelderup, in Norwegian, and by Henry T. Finck, in English. The latter contains a list of pamphlets and magazine articles on Grieg.

GRIERSON, *grēr'son*, Benjamin Henry, u.s.a.; b. Pittsburg, Penn., 1837, July 8. During the civil war he was appointed aide on the staff of Gen. Prentiss; maj. 6th Ill. cav. 1861, Aug.; col. 1862, Mar. 28; commander of a cav. brig. 1862, Dec.; brig.gen. vols. 1863, June 3; maj.gen. vols. 1865, May 7.; col. 10th U. S. cav. 1866, July 28; and brevetted brig.gen. and maj.gen. U. S. A. 1867, Mar. 2. He was one of the most conspicuous cav. leaders, and conducted many noted raids and expeditions. After the war he commanded the Indian Terr. dist. 1868-73, was engaged in scouting and exploring duty and Indian campaigns 1875-81, and was appointed commander of the dist. of N. Mex. 1886, Nov. 13.

GRIESBACH, *grēs'bach*, Johann Jakob: author of the first critical edition of the New Testament; 1745, Jan. 4—1812, Mar. 24; b. Butzbach, in Hesse-Darmstadt. While Griesbach was a child, his father was called to St. Peter's Church, in Frankfurt-on-the-Maine, where he was also made consistorial councilor, and Griesbach received his first education at the gymnasium of that city, and afterward studied theology at Tübingen, where the old dogmatic was still predominant; at Halle, where Semler influenced his whole afterlife; and at Leipsic, where he became acquainted with Ernesti. Having applied himself specially to the criticism of the New Testament text, which had become a favorite study among theologians, Griesbach undertook a journey to various libraries of Germany and Holland, to London, Oxford, Cambridge, and Paris. On his return, he published *De Codicibus Evangeliorum Origenianis* (1771), and commenced lecturing as *Privat-docent* in Halle. In 1773, he was made extraordinary prof., but in 1776 was

called as ordinary prof. to Jena, where he continued with great success, and many honors, till his death. The great work with which his name is associated is his critical revision of the New Testament Greek text. Besides pointing out new sources for discovery of the original reading, attempting a history of the sacred text (*Curæ in Historiam Textus Epp. Paul.*, 1777), and laying down more certain laws of criticism (*Symbolæ Criticæ ad Supplendas et Corrigendas Varias Lectiones N. Test.*, 2 vols. 1785-93), Griesbach was the first who dared to print the New Testament text, as he had been enabled to determine it by his critical science. The first specimen that he published was *Synopsis Evangeliorum* (2 vols. 1774-5; 2d ed. 1809). This was followed, 1775-77, by an edition of the whole New Testament, published again 1796-1806, and of which a reissue was begun by D. Schulz 1827, but not completed. The second ed. has been twice reprinted in London, 1809 and 1818; an American ed. was published Boston 1808. Besides smaller editions, a splendid one in 4to was published by Göschen at Leipsic 1803-07. Griesbach's other works, *Populäre Dogmatik* (1779; 4th ed., 1789), *Commentarius Criticus in Textum N. Test.* (2 vols. 1798-1811), and the *Opuscula Academica* (2 vols. 1824-5, edited by Gabler), are now less known. A competent authority, comparing Griesbach with those who preceded him in his department, pronounced Griesbach 'the most consummate critic that ever undertook an edition of the New Testament.' The grand feature of Griesbach's critical system is his threefold division or classification of the New Testament MSS.: these divisions which he called 'recensions,' or 'codices,' consisted of—1. The Alexandrine recension; 2. The Latin or Western recension; 3. The Byzantine or Eastern recension. Griesbach endeavors to show that the early Fathers, according to their locality, made use of a particular set of MSS.; exhibiting certain peculiarities such as justify the above division. Griesbach expressed his decided preference for the Alexandrine recension, both in regard to antiquity and purity; the Byzantine he considered the least trustworthy. In the construction of his text he took the Elzevir edition as his basis. Among the most memorable of Griesbach's triumphs as a critic is his exposure of the interpolation of the well-known passage relative to the doctrine of the Trinity, I John v. 7. His life has been written by Köthe (Jena 1812), Augusti (Berl. 1812), and Eichstädt (Jena 1815).

GRIEVE, n. *grēv* [AS. *gerefa*, a governor; Ger. *graf* and *gravio*, an elder, a count (see REEVE 1)]: a farm overseer; an overseer of any work; a bailiff.

GRIEVE, GRIEVOUS, etc. See under GRIEF.

GRIFFIN, n. *grĭf'fĭn*, also GRIF'FON, n. *-fŏn* [F. *griffon;* L. *gryphus* for *gryps;* Gr. *grups*, a griffin: Gr.

grupos, carved, hook-nosed]: fabulous chimerical creature, which the fancy of the modern has adopted from that of the ancient world. The griffin is mentioned first by Aristeas, perhaps about B.C. 560 (see Liddell and Scott's *Gr. Dic.*), though the accounts of Aristeas seem about as fabulous as those of the griffin. For the origin of such monstrous conceptions in general, see DRAGON. The griffin is variously described and represented, but the shape most frequent is that of an animal generated between a lion and an eagle, having the body and legs of the former, with the beak and wings of the latter. In this form it appears on antique coins, and as an ornament in classical architecture. Like all other monsters, griffins abound in legendary tales of the Teutonic nations, and the name in various forms, slightly differing [Ger. *Greif*, Dan. *Grif*, etc.], is in most Teutonic dialects. Whether in the two cases both the name and the notion might not be traceable to a common source, or whether it was through barbarian or classical channels that they found their way into the nomenclature and the practice of heralds, are subjects of doubt. There are few fabulous conceptions with which heraldry is more conversant than the griffin. Nor were they regarded by the patriarchs of that science always as mere creatures of the imagination, for incredible as it may seem, we find Gerard Leigh, a herald of great repute in the time of Elizabeth, talking of them with entire sincerity as existing animals. 'I thing they are of great hugeness,' he says, 'for *I have a claw of one of their paws*, which would show them to be as big as two lions.'—See Newton's *Display of Heraldry*, p. 126. In the heraldic griffin, the claws of the eagle are usually substituted for the fore-paws of the lion. Gwillim blazons a griffin in this attitude 'rampant,' alleging that any fierce animal may be so blazoned as well as a lion: but the more appropriate and usual term is 'Segreant.' In representing the griffin, the ears ought not to be omitted, as they indicate the attribute of watchfulness, which, with strength and swiftness, were essential in the classical conception of his character. See WYVERN.

The name GRIFFIN, in natural history, is sometimes appropriated, as by Cuvier, to the genus *Gypaëtos*, of which the LÄMMERGEIER (q.v.) is the best known species; while in France it is generally bestowed, under the slightly modified form *griffon*, on the TAWNY VULTURE (*Vultur* or *Gyps fulvus*), called also the Griffin Vulture or Griffon Vulture, a bird which inhabits most of the high mountainous regions of Europe, as well as those of n. and central Asia, and n. Africa. A specimen was caught in s. Ireland 1843, the only one known to have found its own way to the British Islands. The Griffin Vulture is more than four ft. in length; it is of yellowish-brown color, with darker quills and tail; the head and upper part of the neck covered with short

white down, the lower part of the neck surrounded with a ruff of long slender white down. Its habits are those of vultures in general. The term griffin is familiarly applied in England to a young man going for the first time to India.

GRIFFIN, *grif'in*, CHARLES: 1826–1867, Sep. 15; b. Licking co., O.: soldier. He graduated at the U. S. Milit. Acad. 1847, entered the army as brev. 2d lieut., 2d U. S. artill.; served in the Mexican war, was promoted 2d lieut. 1847, Oct.; 1st lieut. 1849, June; capt. 1861; brig.gen. of vols. 1862, June 9; brevet maj.gen. of vols., and col. U. S. A. 1864, Aug.; brevet brig.gen. and maj.gen. U. S. A. 1865, May 13; col. of 35th U. S. inf. 1866, July 28; and fell a victim to yellow fever in Galveston. He was appointed commander of the 5th army corps 1865, Apr. 1, was a commissioner to carry out the terms of Gen. Lee's surrender, and received the arms and colors of the army of N. Va. after the surrender.

GRIF'FIN, CYRUS: 1749–1810, Dec. 14, b. Va.: lawyer. He was educated and married in England, and became a member of the Va. legislature, congress 1778-81 and 1787–8, pres. of congress 1788, president of the supreme court of admiralty so long as it existed, commissioner to the Creek nation 1789, and judge of the U. S. dist. court of Va. 1789, Dec., till his death.

GRIF'FIN, EDWARD DORR, D.D.: 1770, Jan. 6—1837, Nov. 8; b. East Haddam, Conn.; Congl. and Presb. minister. He graduated at Yale College 1790, studied theol., was installed pastor of the Congl. Church in West Hartford, Conn., 1795; became colleague of Rev. Dr. McWharter in the First Presb. Church, Newark, N. J., 1801; was pastor there 1807–09; prof. of sacred rhetoric in Andover Theol. Seminary 1809-11; pastor of Second Presb. Church, Newark, 1815-21; and pres. of Williams College 1821-36. He had great pungency and power as a preacher.

GRIFFIN, GERALD JOSEPH: 1803, Dec. 12—1840, June 12, b. Limerick, Ireland: novelist. In early life he engaged in dramatic study, and wrote two tragedies *Aguire* and *Gisippus*. He went to London 1823, and being unable to dispose of his works, became a newspaper and magazine writer. Beside writing many poems of merit, he published *Holland-Tide* (1827); *Tales of the Munster Festivals* (1827); *The Colleen Bawn* (1828); *The Invasion; The Rivals; The Duke of Monmouth;* and other novels. He became a member of the Soc. of Christian Brothers 1838, took the name of Brother Josephus, and died in the monastery at N. Cork. *The Colleen Bawn* was his most successful novel, and his tragedy *Gisippus* was performed at the Drury Lane Theatre after his death.

GRIFFIS, WILLIAM ELLIOTT, American clergyman and author: b. Philadelphia 1843, Sept. 17. He was gradu-

ated from Rutgers College in 1869, and 1870 went to Japan to organize schools after American methods in the province of Echizan, made a study of the Japanese feudal system, and was professor of physics in the Imperial University in 1872-74. In 1874 he returned to the United States, where he was graduated from the Union Theological Seminary in 1877. He was pastor of the First Reformed Church, Schenectady, N. Y. (1877-86), of the Shawmut Congregational Church, Boston (1886-93), and of the First Congregational Church of Ithaca, N. Y. (1893-1903). In 1891 he was a delegate to the International Congregational Council at London. From 1903 he turned his attention wholly to literary work. An authority on Japan, he also studied the Dutch origins of America and the influence of the Dutch in the formation of the United States. His published works include *The Mikado's Empire* (1876), his best known volume, which has appeared in many subsequent editions; *Japanese Fairy World* (1880); *Corea: the Hermit Nation* (1882); *Corea, Without and Within* (1884); *Matthew Gailbraith Perry: a Typical American Naval Officer* (1887-90); *The Lily Among Thorns* (1889); *Honda the Samurai* (1890); *Sir William Johnson and the Six Nations* (1891); *Japan in History, Folklore and Art* (1892); *Brave Little Holland* (1894); *Townsend Harris: First American Envoy to Japan* (1895); *The Religions of Japan* (1895); *The Romance of Discovery* (1897); *The Pilgrims in their three Homes* (1898); *The Romance of American Colonization* (1898); *The Romance of American Conquest* (1898); *The Student's Motley* (1898); *The American in Holland* (1899); *America in the East* (1899); *Verbeck of Japan* (1900); *The Pathfinders of the Revolution* (1900); *In the Mikado's Service* (1901); *A Maker of the New Orient* (1902); *Young People's History of Holland* (1903); *Sunny Memories of Three Pastorates* (1903); *Dux Christus, an Outline Study of Japan* (1904); etc.

GRIFFITHS, Arthur George Frederick, English soldier and author: b. Poonah, India. He served in the Crimean War, was inspector of prisons 1878-96, edited *The Fortnightly Review* (1884), and *The Army and Navy Gazette* (1900-4). He is the author of *The Queen's Shilling* (1872); *Memorials of Millbank* (1875); *Lola: a Tale of the Rock* (1878); *Chronicles of Newgate* (1883); *A Prison Princess* (1890); *Secrets of the Prison House* (1893); *Criminals I Have Known* (1895); *The Rome Express* (1896); *Wellington and Waterloo; Mysteries of Police and Crime* (1898); *A Girl of Grit* (1898); *Ford's Folly, Ltd.* (1899); *The Brand of the Broad Arrow* (1900); *A Set of Flats* (1901); *A Duchess in Difficulties; Tales by a Government Official; Fifty Years of Public Service;* etc.

GRIFFON, or Bassett-griffon, a large grayish-red

field-dog, combining the qualities of both pointer and setter, but having a thick hard coat enabling it to work readily in thickets and rough country. It originated in Germany at the end of the 19th century.

GRIG, n. *grĭg* [from its *wriggling* motion: Norw. *krak* or *krik*, a little creature: Dut. *kriek*, a cricket]: a small eel; a sand-eel; a grasshopper or cricket. As MERRY AS A GRIG, exceedingly lively and happy, expressed by physical motions, compared to the very lively motions of the grig. *Note.—As merry as a cricket* is a phrase used in the same sense.

GRIGGS, EDWARD HOWARD, American lecturer: b. Owatonna, Minn., 1868, Jan. 9. In 1889 he was graduated from Indiana University (Bloomington), and later studied at the University of Berlin, and was successively instructor in English literature and professor of literature in Indiana University. Subsequently he became professor of ethics, and upon the combining of the departments, professors of ethics and education, in the Leland Stanford, Jr. University. From 1899 he was active as a public lecturer, particularly in connection with the courses of the Brooklyn (N. Y.) Institute of Arts and Sciences. He wrote *Moral Education* (1904).

GRIGGS, JOHN WILLIAM, American politician: b. Newton, N. J., 1849, July 10. He was graduated at Lafayette College in 1868, and was admitted to the bar in 1871, practising in Paterson, N. J. He was a member of the New Jersey General Assembly 1876-77; a state senator, 1882-88; and president of the state senate in 1886. He became governor of New Jersey 1896, Jan. 1, resigning 1898, Jan. 31, to become attorney-general in President McKinley's cabinet. He resigned in 1901, April.

GRILL, v. *grĭl* [F. *griller*, to broil—from *grille*, an iron grate—from mid. L. *cratic'ŭla*, a gridiron]: to dress or broil on a gridiron; to harass: N. that which is broiled on a gridiron; the large gridiron so used. GRIL'LING, imp. GRILLED, pp. *grĭld:* ADJ. broiled on a gridiron. GRILLADE', n. *-lād'*, the act of grilling; something broiled.

GRILLE, n. *grĭl:* open grate or grating; lattice work of metal; used as a screen for a tomb, relic, shrine, etc.; the gate or entrance to a religious house or sacred building; a small screen in the outer door of a monastic or conventual building, to allow conversation without opening the door.

GRILLPARZER, *grĭl'pâr-tsĕr*, FRANZ: 1790, Jan. 15—1872, Jan. 21; b. Vienna: Austrian dramatic poet. He attracted the notice of the public in 1816 by a tragedy, *Die Ahnfrau* (The Grandmother). In 1819 appeared *Sappho*, and 1822 *Das Goldene Vliesz* (The Golden Fleece), which, though they had small success on the stage, were highly admired as literary productions. The most important of his subsequent works are *König Otto-*

kar's Glück und Ende (King Ottokar's Fortune and End, 1825), a tragedy regarded by some as his masterpiece; *Melusina* (Vienna 1833); *Des Meeres und der Liebe Wellen* (The Waves of Love and of the Sea, 1840), founded on the story of Hero and Leander, and remarkable not only for its particular beauties, but also as a whole for its unusual delicacy and simplicity; and *Der Traum im Leben* (The Dream of Life, 1840), a richly poetical drama. Grillparzer wrote also some comedies, and several very beautiful lyric poems, which reveal a half-suppressed but genuine love of liberty. Grillparzer became a most popular author of the day in Austria. He was of a contemplative and retiring nature; he had a strong and penetrating intellect, and at times gave keen epigrammatic thrusts.

GRILSE, n. *grĭls:* in *Scot.*, a salmon not fully grown, usually one in its second year: see SALMON.

GRIM, a. *grĭm* [Ger. *grimm*, fury, wrath: Dan. *grim*, ugly, grim: Ger. *grimmig*, crabbed, enraged: Icel. *grimmr*, stern: W. *grem*, a grinding or gnashing of the teeth]: ugly and fierce; stern and surly; impressing terror and alarm. GRIM'LY, a. *-lĭ*, in *OE.*, having a frightful or hideous look: AD. in a grim manner; hideously. GRIM'NESS, n. fierceness of look; sternness. GRIM-FACED, having a grisly appearance, and stern scowling look.—SYN. of 'grim': ghastly; grisly, fierce; surly; frightful; horrid; horrible; ferocious; furious; stern; sullen; sour; hideous; ugly.

GRIMACE, n. *grĭ-māsʹ* [F. *grimace*, a crabbed look: Dut. *grimmen*, to snarl, to grin: Icel. *grima*, a masque: It. *grima*, wrinkled: comp. Gael. *grimeach*, grim, surly]: a snarled, crabbed look; a wry face; a distortion of face from habit, affectation, or insolence. GRIMACED, a. *grĭ-māstʹ*, distorted.

GRIMALKIN, n. *grĭ-măl'kĭn* [*gri*, a corruption of *gray*, and *malkin*, a dim. of *mall*, *moll*, or *mawkin*, for *Mary*, a scarecrow]: an old cat; a fiend supposed to resemble an old gray cat. *Note.*—On the other hand, we have GRIMALKIN, the fiend of old poetry, the Gael. *grim-maol-ceann*, the grimbald head—from *grimeach*, fierce; *maol*, bald; *ceann*, head. The meanings attached to this word are confused, and so are the etymons. We have in Scot. *maukin*, Gael. *maigheach*, a hare; the primary sense, as in Shakespeare, is 'a hare, a witch who could transform herself into a hare'; popularly a hare is called a *puss*.

GRIME, n. *grīm* [Norw. *grima;* Dan. *grime*, a streak or spot of dirt on the face: Icel. *grima*, a blackened face, a mask: It. *groma*, the dirt that sticks to anything]: foul matter; dirt; a blackness and foulness not easily cleansed: V. to foul or soil deeply. GRI'MING, imp. GRIMED, pp. *grīmd.* GRIMY, *grī'mĭ*, dirty; foul.

GRIMKE, *grĭm'ke*, ANGELINA EMILY: abolitionist:

1805, Feb. 20—1879; b. Charleston S. C.: daughter of Judge John Faucheraud Grimke. She received a liberal education, removed to Philadelphia and joined the Soc. of Friends 1828; emancipated the slaves inherited from her parents 1836, and with her sister Sarah began lecturing against slavery in New York the same year. She married Theodore Dwight Weld 1838. The Grimke sisters attained wide repute for their eloquence, lectured through New England for the Mass. Anti-Slavery Soc., and published numerous letters, pamphlets, and other works on slavery, abolitionism, and women's rights. Angelina afterward was associated with her husband in his educational and reformatory labors. Her brother, THOMAS SMITH GRIMKE, LL.D.: 1786, Sep. 26—1834, Oct. 11; b. Charleston: lawyer, scholar, and reformer: graduated at Yale College 1807, studied law in Charleston, and attained marked eminence at the bar. He was a member of the state senate 1826-30, supported the federal govt.'s tariff measure 1828, and opposed with much vigor the state nullification schemes. He was a fine classical scholar, yet deprecated the general study of the classics and mathematics in the United States, was one of the earliest temperance orators and advocate of spelling reform, and wrote and spoke frequently in behalf of peace, human freedom, education, and the Sunday-school.

GRIM'KE, SARAH MOORE: abolitionist and reformer: 1792, Nov. 6—1873, Dec. 23; b. Charleston; sister of Angelina E. She removed to Philadelphia, and joined the Soc. of Friends 1821, set free her inherited slaves 1836, became an active member of the American Anti-Slavery Soc., and after the marriage of her sister Angelina made her home with the Weld family, and was a teacher in their schools at Belleville, N. J., 1840, Englewood, N. J., 1854, West Newton, Mass., 1863, and Hyde Park, Mass., 1864. She published *An Epistle to the Clergy of the Southern States* (1827), *Letters on the Condition of Woman and the Equality of the Sexes* (1838), a translation of Lamartine's *Joan of Arc* (1867), and several smaller works.

GRIMM, *grĭm*, FRIEDRICH MELCHIOR, Baron VON: 1723, Dec. 25—1807, Dec. 19; b. Regensburg, Bavaria: eminent critic of the 18th c., who, during his long residence in Paris, was intimate with the most celebrated personages of the day. Having completed his studies, he accompanied the young Count de Schönberg to the univ. at Leipsic, and afterward to Paris. Here he became reader to the crown-prince of Saxe-Gotha, but the situation was not remunerative, and Grimm was in straightened circumstances when he became acquainted with Rousseau. The latter introduced him to Diderot, Baron Holbach, Madame d'Epinay, and other distinguished persons, and he soon became a general favorite. His connection with the encyclopedists (q.v.), and his multifarious acquirements and versatility of mind, soon

opened to him a brilliant career. He became sec. to the Duke of Orleans, and began to write his literary bulletins for several German princes, containing the ablest analysis of all the most important French works: in these he is believed to have been assisted by the Abbé Raynal and Diderot. 1776 he was raised by the Duke of Gotha to the rank of baron, and appointed minister-plenipotentiary at the French court. On the breaking out of the Revolution, he withdrew to Gotha, and 1795 the empress of Russia appointed him her minister-plenipotentiary at Hamburg. In ill-health, he returned to Gotha, where he died. His *Correspondance Littéraire, Philosophique et Critique*, was published after his death, 16 vols. A supplement is the *Correspondance inédite Grimm et Diderot* (Paris 1829), containing a complete history of French literature, 1753-90, and remarkable for brilliant and piquant criticism.

GRIMM, Jakob Ludwig Karl: 1785, Jan. 4—1863, Sep.; b. Hanau, in Hesse-Cassel; German philologist and antiquary. He was educated in classical and legal studies at Marburg, and visited Paris, where he pursued a variety of studies, especially mediæval literature. On his return to Germany, he was appointed sec. to the minister of war at Hesse-Cassel, and became successively librarian of Wilhelmshöhe, and auditor to the council of state. In 1814, he was sec. to the embassador of the Elector of Hesse, whom he attended at Paris, and at the Congress of Vienna. In 1815, he was appointed a commissioner by the Prussian govt. to claim the restoration of valuable manuscripts which had been removed to Paris by the armies of Napoleon I. In 1830, he received the appointment of prof. of German literature, and librarian of the Univ. of Göttingen. In this position he gave seven years to the study of the language, ancient laws, history, and literature of Germany. He was one of the seven professors who protested 1837 against the abolition of the constitution by the king of Hanover, for which act he was outlawed, and obliged to retire to Cassel. In 1841 he was invited to Berlin, where, as member of the Acad., he was entitled to give lectures. He sat as a member of the Assembly of Frankfurt 1848. Though holding at various times important public offices, his life was devoted to philological and antiquarian studies, and to works which are mines of erudition, results of wonderful industry combined with enthusiasm for everything German. His German *Grammar*, four vols., vol. I published 1819, vol. IV. 1837, is perhaps the greatest philological work of the age; it may be said to have laid the foundation of the *historical* investigation of language. It traces the German language through all its dialects. Some idea of its thoroughness may be got from the fact that the vowels and consonants alone occupy 600 pages. His *Deutsche Rechts-Alterthümer* (Antiquities of German Law, 1828), and *Deutsche Mythologie* (German Myth-

ology, 1835), are exhaustive works on the society of the middle ages in central Europe, and the religious traditions and superstitions from the earliest times. His *Geschichte der Deutschen Sprache* (History of the German Language), and *Ueber den Ursprung der Sprache* (On the Origin of Language), are works of great importance. In company with his brother Wilhelm, he published numerous works of more popular character, the best known of which is *Kinder und Hausmärchen* (Nursery and Fireside Stories). The greatest joint undertaking of the two brothers (now carried on by other scholars) is the *Deutsches Wörterbuch*, begun 1852, and yet far from completion. See GRIMM'S LAW.

GRIMM, WILHELM KARL: 1786, Feb. 24—1859, Dec.; b. Hanau, in Hesse-Cassel; brother of Jakob Ludwig Karl Grimm. He was the companion of his elder brother at the Lyceum of Cassel, and the Univ. of Marburg. 1814, he was sec. of the librarian of Cassel, and removing to Göttingen 1830, was appointed under-librarian and supernumerary prof. of philosophy. He joined his brother in the protest against the king of Hanover, shared his exile, and his call to Berlin. From boyhood through life they were almost inseparable companions; they labored together, and were commonly known as the Brothers Grimm. Among the works of Grimm are—*Translation of Ancient Danish Heroic Poems of the Sixth Century; German Runic Characters; Heroic Legends of Germany,* etc.

GRIMM'S LAW: the name—derived from the discoverer, Jakob Ludwig Karl Grimm (q.v.)—given to the principle which regulates the interchange of the mute consonants in the corresponding words of the different Aryan languages. A historical survey of this family of tongues shows the consonants go through a cycle of changes (Ger. *Lautverschiebung*). What, for example, was a *p* in the original form of a word, or, at least, in the oldest form known, is found at a later stage transformed into *f*, which next passes into *b;* and this again tends to become *p*, and go through the cycle anew. The following table exhibits the transitions that manifest themselves in regard to the Greek, Gothic, and Old High German:

	Labials.	Dentals.	Gutterals.
Greek (Latin Sanskrit),	p b f	t d th	k g ch
Gothic.....	f p b	th t d	k g
Old High German.....	b(v)f p	d z t	g ch k

There are of course many exceptions, through the influence of adjoining letters and other accidental causes. The following are examples of the law:

Sanskrit.	Greek.	Latin.	Gothic.	Old High German.
pâda-s	pod-os	pedis	fôtus	vuoz
pitrî	pater	pater	fadrein (pl)	vatar
bhri	phero	fero	baira	piru
tvam	tu	tu	thu	du
trayas	treis	tres	threis	drî
pacu	poû	pecus	faihu	vihu

It is the High German dialects that the action of this principle is most marked. In the Teutonic tongues of the 'low' type, of which English is one, the consonants have remained at the same stage of development that they had attained in the Gothic (e.g. Eng. *father, foot, bear, three*—see corresponding examples above); the Old High German exhibits a third stage; and in modern High German the principle seems still at work, though its development is hindered by the crystallizing effect of written language.

GRIMSHAW, Robert: engineer, author, and encyclopedist: b. Philadelphia, Pa., 1850, Jan 25. After receiving an education in the schools of his native city, he learned engineering, but subsequently engaged in literature and wrote extensively for scientific and technical journals, and lectured for a number of years in Franklin Institute, Philadelphia. He was one of the editors of the *Polytechnic Review*, *Standard Dictionary*, and *Iconographic Encyclopedia*, and contributed to the *International Encyclopedia*, Appleton's *Cyclopedia of Mechanic Arts*, and the *Century Dictionary*. He has more recently been connected with the editorial staff of the United Editors' *Encyclopedia and Dictionary*, and has for some time past been professionally engaged in Germany. Among his published works are, *Saws* (1880); *Steam Engine Catechism* (1887); *Records of Scientific Progress* (1891); *Hints to Power Users* (1891); *Fifty Years Hence* (1892).

GRIN, v. *grĭn* [Dut. *grijnen*, to weep: Icel. *grenja*, to howl: Ger. *greinen*, to grin; Norw. *grina*, to wry the mouth. F. *gronder*, to snarl: L. *ringi*, to open wide the mouth, to show the teeth: comp. Gael. *greann*, a surly, angry look: an imitative word] to close or clinch the teeth and open the lips, as in mirth, scorn, or anguish; to show the teeth and snarl like a dog: N. the act of closing the teeth and showing them; an affected laugh. Grin'ning, imp.: Adj. showing a grin. Grinned, pp. *grĭnd*. Grin'ner, n. one who. Grin'ningly, ad. *-lĭ*.

GRIND, v. *grīnd* [Dut. *grimmen*, or *grinden*, to grin, to grind the teeth—from *grinding the teeth*, the term being transferred to the breaking small by a mill: an imitative word]: to break and reduce to powder by friction or rubbing, as between stones; to sharpen or polish; to oppress by severe exactions; in *familiar language*, to prepare a student for examination, or to prepare one's self; to perform the operation of grinding. Grind'ing, imp.: Adj. harassing; oppressing: N. act or process by which anything is ground: the act of preparing one's self for examination. Ground, pt. and pp. *grownd*, did grind. Grind'er, n. on who, or that which; a back or molar tooth. Grind'stone, n. a flat circular piece of sandstone or standstone-grit, made to revolve on an axis, and used for sharpening tools, and for grinding steel, glass, and other stones. They are of

various degrees of coarseness for various purposes. Artificial grindstones are made of emery, sometimes 3 ft. in diameter, and strong enough to be driven at the rate of 6,000 ft. a minute, at which rate they easily cut tempered steel. They are commonly called emery wheels.

GRINDAL, *grĭn'dĕl*, EDMUND, Archbishop of Canterbury: 1519–1583, July 6; b. Kensingham, England. He was educated at Cambridge, became pres. of Pembroke Hall 1549, chaplain to Bishop Ridley 1550, precentor of St. Paul's and chaplain to Edward VI. 1551, and prebendary of Westminster 1552. He removed to Strasburg on the accession of Queen Mary, and spent 5 years collecting the writings and personal notes of the 'learned and pious sufferers of England,' which afterward formed a large part of Fox's *Book of Martyrs*. In 1558 he returned to England and was selected as one of a committee to prepare a new liturgy and also as one of the 8 Prot. divines to oppose the Rom. Cath. prelates in public debate. In the following year he became master of Pembroke Hall and succeeded Dr. Bonner as bp. of London. With Abp. Parker he suspended those of the London clergy who refused to submit to the 'Act of Uniformity,' and was nearly mobbed by the wives of the suspended clergy 1565. In 1570 he was translated to the see of York, and 1576 succeeded Dr. Parker as abp. of Canterbury. He soon incurred the displeasure of Queen Elizabeth by declining to break up the meetings of the clergy for mutual improvement, and was confined to his house and suspended from ecclesiastical functions by order of the 'star chamber.' Subsequently he was partially restored to power, became blind, resigned his office 1583, Apr., and was pensioned. His literary remains were published by the Parker Soc. of London.

GRIND'ING: operation of shaping any hard substance by rubbing away its surface with a rough stone or with a cutting powder. It is similar to filing, and is used in cases where, from the hardness of the material, or for other reasons, filing is inapplicable. Thus cutting tools and other steel instruments may be filed before hardening and tempering; but after this, if further abrasion is required, they must be ground. Glass lenses and metal specula are ground to their shape with emery-powder laid on a metal tool. Ornamental glass is ground into facets or otherwise by means of stones and lap wheels. Diamonds and other gems are ground or cut with diamond-dust imbedded in soft iron. When large flat surfaces are required, they are obtained by first working two pieces of the substance nearly flat, and then laying one upon the other, and grinding their surfaces together with sand, emery, or other suitable cutting powder. Plate-glass is flattened in this manner; also surfaces of cast iron where accurate fitting is required, the iron surface being either prepared with a planing-machine, or by turning in a lathe with a slide-rest. Sockets and other bearings which require to be

fitted with great accuracy are finished usually by grinding together. For brass and bell metal powdered pumice stone is best adapted for such purposes, as emery is liable to imbed itself in the metal, and give it a permanent action upon the bearings.

Dry grinding is the term applied to the grinding of steel with dry grindstones. Its principal applications are in grinding the points of needles and forks, the surfaces of gun-barrels, and in finishing steel-pens. This kind of work produces painful irritation in the throat and nostrils of those who follow it; and though the distressing effects have been much diminished of late by the introduction of currents of air to carry away the particles of steel, and mouth-pieces of damp cloth, the evil is not entirely obviated; in some branches, such as gun-barrel grinding, it is still very great. Besides this evil, the stones used for gun-barrel grinding, which are very large, revolve with great rapidity, and occasionally break or 'burst' with great force while revolving, and seriously endanger the lives of the men. See GRINDSTONE.

A distinct kind of grinding is that of crushing and rubbing a substance into a fine powder. This is effected by passing the substance between rough stones, as in the common flour-mill, or between rollers, either smooth or toothed, according to the degree of fineness required, or by a heavy stone or iron cylinder revolving upon a smooth plate. Colors are ground in small quantities with a *muller* and *slab*. The muller is a heavy piece of stone of somewhat conical shape, and which rests on its base upon the slab of stone, and is grasped by the hands, and the color is mixed to a pasty consistence with the required medium of oil or water, and rubbed between the two surfaces until smooth and impalpable. On a large scale, iron or stone cylinders revolve on a slab in such a manner that they shall not merely roll but shall also rub upon the surface of the slab. A knife or scoop follows one cylinder and precedes the other, scooping the paste into the position required to come fairly under the cylinder which follows it.

GRINNELL, *grĭn-ĕl'*: Iowa, city in Poweshiek co., on the Chicago Rock Island & Pacific and the Iowa Central railroads, 55 m. e. by n. of Des Moines. It was founded in 1854, by a colony headed by Rev. J. B. Grinnell, who besides building a church and preaching there gratuitously for several years, did much to advance the material growth of the town. It is the principal trade centre for the co., and manufactures flour, carriages, gloves, and farming implements. It is the seat of Iowa College (Congregational), the oldest college in the state, opened at Davenport in 1848 and removed to Grinnell in 1858. The college buildings are extensive and handsome, having all been erected since 1882, when a tornado destroyed the older ones. The city is located in the midst of a rich agricultural section, and its population

is composed of an unusually intelligent and progressive class of citizens. Pop. (1910) 5,036.

GRINNELL', HENRY: 1799, Feb. 13—1874, June 30; b. New Bedford, Mass.: merchant. He graduated at the New Bedford Acad. and became a clerk in a New York commission house 1818. Soon afterward he became a partner in the whale-oil shipping firm of Grinnell, Minturn & Co., with which he remained actively connected till his retirement from business in 1849. He was an earnest friend of seamen, first pres. of the American Geographical Soc. 1852-3, and vice-pres. 1854-72. He is remembered for his liberal aid in extending a knowledge of arctic geography. In 1850 he bore the entire expense of an expedition to search for the English arctic explorer Sir John Franklin, of whom nothing had been heard for 5 years. This expedition started under command of Lieut. E. J. De Haven, U.S.N., with Dr. Elisha Kent Kane (q.v.), as surgeon and naturalist, discovered land in lat. 75° 24′ 21″, and named it in his honor Grinnell Land. In 1853 with George Peabody (q.v.) he fitted out a second expedition for the same object, and to which the govt. gave large aid. This expedition first demonstrated the existence of an open polar sea, mapped the coast-line, and penetrated previously unknown regions. In 1860 he contributed largely to the expedition under Dr. Isaac Israel Hayes (q.v.), and 1871 to the unfortunate 'Polaris' expedition (see HALL, CHARLES FRANCIS).

GRINNELL', JOSIAH BUSHNELL: philanthropist: b. New Haven, Vt., 1821, Dec. 22; d. Marshalltown, Iowa, 1891, March 31. He graduated at Auburn Theol. Seminary 1847; was ordained a Presb. clergyman; held pastorates in Union Village, N. Y., Washington, and in a Congl. church in New York; removed to Ia., founded the town of Grinnell and a Congl. church (1854), and preached there gratuitously several years; and subsequently engaged in wool-growing and railroad building. In 1856–60 he was member of the state senate; 1863–67 representative in congress as a republican; 1868 special agent of the treas. dept.; and 1884 was appointed commissioner of the U. S. bureau of animal industries. He aided in building 6 railroads; laid out 5 towns; founded Grinnell Univ., now merged in Iowa College, and was its pres.; contributed liberally to the new building fund of the college after the tornado of 1882; and published many addresses and pamphlets, and *Home of the Badgers* (1845); and *Cattle Industries of the United States* (1884).

GRINNELL LAND, *grĭn-ĕl′:* tract on the w. side of Kennedy Channel (northern continuation of Smith's Sound), which separates it from Greenland. It was discovered 1850, and named by a U. S. ship under command of Lieut. De Haven in the expedition sent out by Henry Grinnell (q.v.), merchant of New York. Next

year an English expedition, in ignorance, called it Albert Land. The region is barren in the extreme, mountainous, and has many glaciers. Musk oxen are numerous. It was visited by the expedition under Narses 1875–6 Greely 1881, Lockwood 1882, and Peary 1898–9.

GRIP, n. *grĭp* [Dut. *gruppe,* or *grippe,* a furrow: Ger. *grube,* a ditch—from *graben,* to dig: connected with GROOVE]: a little ditch or channel for surface-water.

GRIP, n. *grĭp* [see GRIPE]: a grasp; a holding fast; strength in grasping; a peculiar mode of clasping the hands; that by which anything is grasped: V. to grasp; to hold fast. GRIP'PING, imp. GRIPPED, pp. *grĭpt.*

GRIP, or GRIPE, n. *grĭp* [Gr. *grups;* L. *gryps,* a griffin —from Gr. *grupos,* curved]: in *OE.,* a griffin.

GRIPE, n. *grīp* [Dut. *grijpen;* Ger. *greiffen;* Icel. *gripa,* to seize: F. *griffe,* a claw; *gripper,* to clutch or seize: It. *grifo,* a claw]: a clasping with the hand or arms; a hold; a grasp; pinching distress; oppression; pain in the bowels: V. to catch with the hand; to seize; to grasp; to pinch; to press; to cause a colicky pain in the bowels; in *nav.,* applied to a ship when she runs her head too much into the wind. GRI'PING, imp.: ADJ. catching or holding, as in a gripe; distressing, as griping poverty: N. the sensation of pain or pinching; distress. *Griping,* or *Gripes,* is a popular name for all painful affections of the bowels, whether attended with constipation (or diarrhœa): when pains of this kind are spasmodic, they are termed colic. The action of purgative medicine is often attended by griping pain, which may be averted in some cases by careful choice of the medicine, or by combination of it with carminatives, or with a little opium. GRIPED, pp. *grīpt.* GRI'PER, n. one who. GRI'PINGLY, ad. *lĭ.*—SYN. of 'gripe, v.': to catch; snatch; squeeze; clasp; clutch; embrace; straiten; distress.

GRIPPE, *grĭp,* LA: see DENGUE: INFLUENZA.

GRIQUALAND WEST AND EAST, *grē'kwa-lănd:* two territories in s. Africa, annexed 1871 to Cape Colony, and named for the Griquas or Bastaards, who are a mixed race, sprung from the intercourse of Dutch settlers with Hottentots and Bush women. Some of the Griquas are partially civilized; some are also professedly Christian.—*Griqualand West* lies n.e. of Cape Colony, is bounded on the s. by the Orange river, on the n. by Bechuana territory, on the e. by Orange Free State, on the w. by the Kalahari country. Portions of the country are suitable for sheep-farming and agriculture, but the chief source of wealth is the diamond-fields. The first diamond was discovered in 1867, and from that time a steady stream of emigration set in; settlements were formed, all nationalities being represented, and digging was vigorously prosecuted. The territory of the diamond-fields had been secured to

Waterboer, a native chief, but disputes arising as to his boundaries, Griqualand West was annexed to Cape Colony, as British territory, 1871. Kimberley is the chief center of the diamond industry, and is the seat of government. The chief settlements are De Beer, Du Toit's Pan, Bultfontein, Barkly, and Griqua Town. The estimated area of Griqualand West is 17,491 sq. m.; pop. about 85,000.—*Griqualand East* is that part of No-Man's-Land which lies between the Kafir border and s. Natal. It was allotted to Adam Kok, who had removed thither with 15,000 Griquas, and to the Basutos who had previously migrated into that country. This territory was annexed to the Cape Colony 1875. Wheat is cultivated in considerable quantities in that part occupied by the Griquas, and many of the Basutos living in the west are in comfortable circumstances. Pop. about 154,000.

GRIS, or GRISE, n. *grĭs* [Icel. *griss;* Dan. *griis,* a pig]: in *Scot.* and *OE.,* a pig. GRISKIN, n. *grĭs'kĭn,* a sucking pig; a little pig; the roast spine or loin of pork [Gael. *grisg,* to roast]. *Note*—There is here confusion arising from similarity of sound: *griskin,* 'a little pig,' appears to have its origin from *gris,* a pig, *kin,* little: while *griskin,* a roast loin of pork, is apparently from Gael. *grisg,* to roast: we have also Gael. *grisgean,* a piece of roast meat of any kind.

GRIS-AMBER: used by Milton for AMBERGRIS (q. v.).

GRISE, n. *grēs:* in *OE.,* a step: see GREE 3, and GREES.

GRISELDA, *grē-zĕl'dâ,* or GRISELDIS, *grē-zĕl'dĭs:* heroine of a celebrated mediæval tale, which probably had its rise in Italy. A poor girl, who was a charcoal-burner, was raised to be the wife of the Marquis of Saluzzo, who put her humility and obedience to the severest tests. She, however, passed through them all triumphantly, and a reconciliation took place. In this legend, the endurance and self-renunciation of the loving woman are represented as carried to the highest pitch. We find the tradition worked up into a tale, said to be founded on fact, first in Boccaccio's *Decameron;* Petrarch translated it into Latin 1373, under the title *De Obedienta, et Fide Uxoria;* and in the 14th c., the story was well known throughout Germany. In 1393, it was wrought into a 'mystery' play in Paris; in England, the drama of *The Patient Grissel* appeared 1599, and one on the same subject by Hans Sachs in Germany 1546. It forms the story of Chaucer's *Clerkes Tale,* and versions of it are found in most European literatures.

GRISETTE, n. *grĭ'zĕt* [F.—from *gris,* gray]: originally a dress of common gray stuff; in *France,* a tradesman's wife or daughter; a shop-girl.

GRISI, *grē'zē,* GIULIA: 1810-69; b. Milan: celebrated vocalist. From a very early age she showed remarkable

musical genius, accompanied by a voice of the rarest promise. At the age of 16, she first appeared in the opera of *Zelmira*, at Bologna, and gathered her earliest laurels by the inimitable quality, melodiousness, and fidelity of her voice, as well as by her pathetic and life-like impersonation of the rôle. Two years later, she appeared at Florence, and to no artist was pre-eminence ever more unanimously accorded. Her greatest early triumph was at La Scala, Milan, where she played the part of Norma in the tragic opera of that name. So thoroughly did she identify herself with this character, that hardly any subsequent singer has ventured on an original and independent personation. Grisi's début at Paris 1832 was equally successful, and overcame the proverbial cynical apathy of the frequenters of the Théâtre Italien. London, however, was the scene of her grandest performances, and most appreciative audiences. Grisi was twice married, first, unhappily, to Mons. Gérard de Melcy; secondly, to Signor Mario, eminent tenor.

GRISLY, a. *grĭz'lĭ* [AS. *grislic*, grisly, dreadful: Bav. *gruseln;* prov. Ger. *grieseln*, to shudder: Gael. *gris*, horror]; frightful; horrible; hideous. GRIS'LINESS, n. the quality of being frightful to look at.

GRISLY, or GRIZZLY, a. *grĭz'lĭ* [see GRIZZLE]: speckled; of mingled black and white.

GRIS-NEZ (or GRINEZ), *grē-nā'*, CAPE: headland of France, dept. of Pas-de-Calais, opposite Dover. It is the point of land nearest the English shore, the distance being barely 21 m. Cape Gris-Nez is about equally distant from Calais on the n.e. and Boulogne on the south. It is surmounted with a light-house, lat. 50° 52′ n., and long. 1° 35′ east.

GRISONS, n. *grĭz'ŭns* [F.; Ger. *Graubünden*]: most eastern of the Swiss cantons; also the largest and the most thinly peopled: bounded n. by St. Glarus, St. Gall, and the Vorarlberg; e. by the Tyrol; s. by Lombardy; w. by Uri and Ticino; 2,770 sq. m. The canton divides itself naturally into three great valley-districts, of which the first and most important lies along the course of the Rhine, and stretches northward, occupying nearly all the w. portion of the canton; and the second, forming the Engadine, extends n.e. along the course of the Inn. The third valley-district comprises several smaller valleys whose streams run southward, belonging to the basins of the Ticino and the Adda. The whole canton is an assemblage of mountains intersected by narrow valleys. The climate is very varied, in some districts winter reigns nearly eight months, while some of the southern valleys resemble Italy. In the colder districts, scanty crops of barley and rye are raised with difficulty; while in the southern valleys, wheat, maize, and also the vine, fig, and almond are successfully cultivated.

Pastures and forests occupy a large portion of the canton; and cattle, timber, and cheese are the principal exports. Iron, lead, copper, zinc, and silver are worked. The rivers abound in salmon and trout, and in the mountains are bears, wolves, lynxes, and wild-cats.

The country was anciently inhabited by the Rhætti, who are by some writers thought to be connected with the Etruscans (see ETRURIA). It was conquered by the Roman emperor Constantius in the 4th c., and his camp (*Curia, Chur,* or *Coire,* the name of the present capital) was planted on the Rhine. Chur has been a bishopric since 450. In the 10th c. the country of the Grisons was added to the German empire, and remained till 1268 subject to the Swabian dukes. With the decay of the imperial authority it came to be oppressed by a numerous nobility, the ruins of whose castles still crown the heights. Against them the people began, in the end of the 14th c., to form leagues in the different valleys. One of these leagues, formed 1424, was called the *gray* league (Ger. *der graue bund;* in the native language, *lia Grischa*), from the gray homespun worn by the unionists, hence the German and French names of the canton—Graubündten and Grisons. In 1472, these separate unions entered into a general federation, which then formed an alliance with the Swiss cantons. It was not till 1803 that Grisons was admitted into the Swiss confederation as the 15th canton. The constitution of Grisons is very complicated, and suffers from the lack of centralization incident to its origin. Of the inhabitants, who also are called Grisons, one-half speak German, and the other dialects derived from Latin. The dialects of the southern valleys are a kind of Italian; the Latin of the Engadine and the Romanese differ greatly from Italian, but are far from being Latin. Pop. (1900) 104,520.

GRIST, n. *grĭst* [OF. *grust,* grain for grinding or for making beer: F. *gruau,* oatmeal]: corn for grinding; the grain carried by a customer to the mill at one time; that which is ground at one time; gain; profit. GRIST-MILL, originally a mill for grinding the quantities of grain brought by different customers. GRIST TO THE MILL, gain or profit.

GRISTLE, n. *grĭs'l* [O. Fris. *gristel,* gristle: Swiss, *kröspelen,* to crunch; *krospele,* gristle: Pol. *grysc,* to gnaw: Dut. *krijsselen;* prov. Eng. *grist,* to grind the teeth]: soft bone which makes a peculiar crunching noise when bitten; in *animal bodies,* a smooth, solid, elastic substance, chiefly covering the ends of bones; cartilage. GRISTLY, a. *grĭs'lĭ,* of or like gristle. GRIST'-LINESS, n.

GRISWOLD, *grĭz'wold,* ALEXANDER VIETS, D.D.: 1776, Apr. 22—1843, Feb. 15; b. Simsbury, Conn.: Prot. Epis. bp. He studied law, worked on a farm, was confirmed

in the church 1786, studied for the ministry, was ordained deacon 1795, June 3; and priest Oct. 1; and had charge of the parishes of Plymouth, Harwinton, and Litchfield, Conn., till 1804, when he became rector of St. Michael's Prot. Epis. church, Bristol, R. I. In 1840, May, he was elected first bp. of the Eastern diocese, which then comprised Me., N. H., Vt., Mass., and R. I., and was consecrated in New York 1811, May 29. He became presiding bp. 1836, received the degree of D.D. from Brown Univ. 1810, Princeton College 1811, and Harvard College 1812, and published *Discourses on the Most Important Doctrines and Duties of the Christian Religion* (1830), *The Reformation and the Apostolic Office* (1843), and *Remarks on Social Prayer Meetings.*

GRISWOLD, MATTHEW, LL.D.: 1714, Mar. 25—1799, Apr. 28, b. Lyme, Conn.: lawyer. He was a member of the legislature 1751, council 1759, and committee of safety 1775, was chief justice of the superior court, lieut.gov. of the state, and gov. 1784–86; presided over the state convention that ratified the Federal constitution 1788, and received the degree LL.D. from Yale College 1779.

GRISWOLD, RUFUS WILMOT, D.D.: 1815, Feb. 15—1857, Aug. 27; b. Benson, Vt.: editor. In early life he travelled extensively in the United States and Europe, learned the printer's trade, became a Bapt. minister, afterward a journalist and editor. He was chief editor of *Graham's Magazine* 1841–43, and of the *International Magazine* (New York) 1850–52, and asst. editor of the *New Yorker, Brother Jonathan,* and *The New World;* compiled *Curiosities of American Literature,* edited the first American edition of Milton's prose works, and was one of the editors of the *Works of Edgar Allan Poe,* 3 vols., (1850). His published works include *Poets and Poetry of America* (Philadelphia 1842), *Biographical Annual* (1842), *Christian Ballads and Other Poems* (1844), *Poets and Poetry of England in the Nineteenth Century* (1845), *Prose Writers of America* (1846), *Washington and the Generals of the Revolution* (1847), *Napoleon and the Marshals of the Empire* (1847), *Female Poets of America* (1848), *Sacred Poets of England and America* (1849), *The Republican Court* (1854), and *Scenes in the Life of the Saviour.*

GRISWOLDVILLE, BATTLE OF. When General Sherman marched from Atlanta to the sea, his right wing, commanded by Gen. Howard, was under instructions to threaten Macon and strike the Savannah Railroad at Gordon, about 20 miles east. Upon his arrival at Clinton, the cavalry advance made a demonstration on Macon, and 1864, Nov. 21, his entire cavalry force took up an advanced position covering all the roads to Macon, and that day and the next all the troops and trains were closed up toward Gordon, except C. R. Woods' division, which was directed to take up a strong posi-

tion on the Irwinton road and demonstrate on Macon and Griswoldville, eight miles east. The demonstration was made on the 22d by Walcutt's brigade of 1,513 men and two guns, in co-operation with Kilpatrick's cavalry on the different roads. Some of Kilpatrick's cavalry were in advance of Walcutt and were fiercely attacked by Wheeler; but with Walcutt's assistance Wheeler was driven from the field, and followed by Walcutt beyond Griswoldville. Walcutt was then recalled to a position a little east of Griswoldville, where two miles in advance of his division, he formed line along a slight rise of ground, with his flanks well protected by swampy ground, and with an open field in front. Kilpatrick's cavalry was on either flank. Walcutt had scarcely thrown up a rail barricade, in view of another attack of Wheeler's cavalry, when he was fiercely assailed by infantry. That morning, under Gen. Hardee's order, Gen. G. W. Smith, in command of a considerable body of Georgia militia that had been concentrated at Macon, directed Gen. Phillips, with a division of infantry and a battery, to march from Macon to Gordon and take trains for Augusta. Phillips had been instructed to halt before reaching Griswoldville and wait for further orders, and was cautioned not to engage an enemy if met, but to fall back to the fortifications at Macon. But when he heard of Walcutt's position he moved through Griswoldville and, with more courage than discretion, threw his four brigades against Walcutt, at the same time opening destructively with his artillery. At 2 o'clock, in three compact lines, his militia charged to within 75 yards of Walcutt's line, and were repulsed. The assaults were repeated in front and on both flanks, and continued until sunset, when, everywhere repulsed, he abandoned the field, leaving his dead and wounded. During the action Walcutt was severely wounded by a piece of shell. The Union loss was 13 killed, 69 wounded, and 2 missing. The Confederate loss was 51 killed and 472 wounded. Consult: *Official Records* Vol. XLIV.; Cox, *The March to the Sea;* the Century Company's *Battles and Leaders of the Civil War*, Vol. IV.

GRIT, n. *grĭt* [AS. *greot*, sand, dust: Icel. *griot;* O. Fris. *gret*, stones: Low. Ger. *grut*, grit, gravel: F. *grès*, gritty stone]: any hard sandstone in which the component grains of quartz are coarse and less rounded or more angular than in ordinary sandstone—the grains being compacted with a hard siliceous cement (see MILLSTONE GRIT): rough hard particles: the coarse part of meal. GRIT'TY, a. *-tĭ*, containing sand or grit. GRIT'TINESS, n. the quality of consisting of hard particles or grit.

GRITS, n. plu. *grĭts:* the proper spelling of GROATS, which see.

GRIVEGNÉE, *grē-vĕn-yā:* manufacturing town of Belgium, about two m. from Liege. Pop. 7,000.

GRIWENNICK, n. *grĭ-vĕn'ĭk* [Rus.]: small silver coin current in Russia, equal to about eight cents.

GRIZZLE, n. *grĭz'l* [F. and Sp. *gris*, gray: Dut. *grijs*, gray: Ger. *greis*, gray, an old man; *grieselen*, to fall in morsels: F. *gresillé*, covered or hoary with rime]: a mixture of white and black; a gray color. GRIZZLED, a. *grĭz'ld*, gray; of a mixed color. GRIZZLY, a. *grĭz'lĭ*, somewhat gray.

GRIZZLIES: an arrangement in the mine sluice to receive and cast aside all the large stones brought down by the current during the process of washing the auriferous gravel.

GROAN, n. *grōn* [Dut. *groonen*, to groan: W. *grwn*, a broken or trembling noise: F. *gronder*, to snarl, to grunt: an imitative word]: a deep mournful sound uttered in pain, anguish, or sorrow: V. to utter a deep moaning sound; to be oppressed or afflicted. GROAN'ING, imp.: N. the act of groaning; lamentation; complaint; a deep sound uttered in pain or sorrow. GROANED, pp. *grōnd*. GROAN'FUL, a. in *OE*. sad; agonizing.

GROAT, n. *grōt* [Dutch, *groot*, great; Ger. *groschen;* L. Ger. *grote;* Fr. *gros*, Ital. *grosso;* Low. Lat. *grossus;* from the same root as Eng. *great*, and meaning *thiek*]: name given in the middle ages to all *thiek* coins, as distinguished from the 'bracteates' [Lat. *braetea*, thin plate or leaf], or thin coins of silver or gold-leaf stamped so as to be hollow on one side and raised on the other. Groats differed greatly in value at different times and in different countries. The silver groat once current in England (introduced by Henry III.) was equal to four pence. The coin—not the name—was for a time revived in the modern fourpenny-piece; and the name familiarly denoted a small sum. Groschen were till lately current in n. Germany. The silver groschen, or neugroschen of Prussia and the Zollverein, was $\frac{1}{30}$th of a thaler, and worth 1⅛d. = a little more than two cents; the guter groschen of Hanover = $\frac{1}{24}$th thaler = 1½d., = a little less than three cents.

GROATS, n. plu. *grōts* [Dut. *grut;* Ger. *grütze*, grain husked and more or less broken: Icel. *grautr;* Dan. *gröd*, porridge: AS. *grut*, meal, wort; also locally *grits*, oats that have the hulls or shell taken off (see GROUT); from the same root as *to grate*, to rub to powder; allied to Eng. *scratch*, and Lat. *rado*, to scrape]: the grain of oats deprived of the integuments, i.e., the hulls or shells: see GROUT.—Groats are much used for preparing *gruel* for invalids, and were formerly often used in broths and soups like pot-barley.—*Embden Groats* are groats broken into small pieces by crushing. For the nutritive and other qualities of groats, see MEAL: OATS.

GROCER, n. *grō'sėr* [F. *grossier*, a grocer; *grosserie*, the wholesale trade, wares sold by wholesale—from *gros*, gross, great]: one who sells tea, coffee, sugar, etc.

GRO'CERY, n. *ĭ*, a grocer's shop or store. GRO'CERIES, n. plu. *-ĭz*, the articles sold by a grocer. GROCERY is sometimes used in the sing., also for articles sold at a grocer's.

GRODEK, *grō'dĕk*, or GRUDEK, *grô'dĕk:* town of Austrian Galicia, 15 m. w.s.w. of Lemberg, with which it is connected by railway; partly on a hill between two small lakes and partly on three small islands. Pop. (1880) 10,116, chiefly German colonists, including also some Jews.

GRODNO, *grŏd'nō:* government of Russia, province of w. Russia, and formerly a portion of Lithuania; bounded n. by the govt. of Vilna, e. by that of Minsk, s. by Volhynia, w. by Poland and the province of Bialystok; 14,532 sq. m. The land is, in general, flat, and belongs in the s.w. to the basin of the Vistula, in the n. to that of the Niemen, and in the s.e. to that of the Dnieper. In the s. extensive morasses occur, though much marshy land has been already converted into pasture-ground by draining; and in the n. are extensive forests, chiefly of pine. The soil is light and sandy (except that of the river-valleys, which is clayey), and is in general fruitful. Rye is the principal agricultural product, the average annual yield being estimated at 2,346,000 English quarters. Barley, flax, hemp, hops, and timber are extensively raised. The bear, the lynx, and the buffalo are found in the forests. Cattle, sheep, and bees are largely reared. The chief branches of industry are the manufactures of cloth, hats, paper, and leather, and the principal exports are corn, cattle, wool, leather, hops, honey, and wax. Pop. (1897) 1,617,859.

GROD'NO: town of Russia, cap. of the govt. of Grodno; on an elevation on the right bank of the Niemen, 160 m. n.e. of Warsaw. It has 14 churches and convents, several synagogues and castles, some ruinous palaces, belonging formerly to old Lithuanian families; a gymnasium; manufactures in cloth, silk, and weapons; and a flourishing trade, almost wholly in the hands of the Jews, who form about three-fourths of the population. The modern palace, erected here by Augustus III., is extensive and handsome. Other principal buildings are the market-place, the equestrian seminary, the high school, the academy for medical science, connected with which are a library, collection in natural history, and a botanic garden. Here, 1586, Stephen Bathori died in his own castle; and here, 1725, Nov. 25, Stanislas Augustus abdicated the Polish crown. Pop. (1897) 46,871.

GROG, n. *grŏg* [said to be so called from the nickname of Admiral Vernon, about 1745, who wore *grogram* breeches]: mixture of spirit and cold water not sweetened, served out as a beverage to men in the British, and formerly in the United States navy. In the British navy men who prefer to abstain from grog receive under recent regulations money or tea instead. In the United

States navy, the ration of grog has long been abolished, but the commanding officer may at his discretion order it served in cases of necessity: V. to recover spirits absorbed in the wood of empty spirit-casks by treating them with water. GROG'GING, imp.: N. the act of recovering spirits from empty spirit-casks by treating them with water. GROGGED, pp. *grŏgd.* GROG-SHOP, or GROG'GERY, n. *-gĕr-ĭ,* a shop dealing in spirits. GROG'GY, a. *-gĭ,* tipsy. *Note.*—Gael. *cròc* denotes a horn, a drinking-cup. In Scot. 'to take a horn' is 'to take a cup of liquor': we say, 'to take a glass,' meaning the liquor in it: Eng. *grog* may have a connection with Gael. *cròc.*

GROGRAM, n. *grŏg'răm* [F. *grosgrain,* coarse grain—from *gros,* great; *grain,* grain]: a fabric with large woof and a rough pile.

GROIN, n. *grŏyn* [F. *groin,* a snout]: in the human body, the depressed part between the belly and the thigh; the angular curve formed by the intersection of two arches.—GROINED, a. *grŏynd,* having an angular curve formed by the intersection of two arches.—*Groined Vaulting* is that kind of vaulting in which the vault is not a plain barrel-vault from end to end, but where one vault cuts into another: the angle formed by the intersection is called the groin. In Roman architecture, the groins were generally left as a plain sharp edge; in Gothic, they were usually protected and strengthened with *ribs:* see VAULT.—GROINS, n. *grŏynz* [OF. *groing,* a tongue of land jutting into the sea]: a frame of woodwork constructed across a beach, perpendicular to the general line of it, to retain or gather shingle.

GROLIER DE SERVIER, *gro-le-ā' dĕh sĕr-ve-ā',* JOHN, Viscount d'Aguisy: 1479-1565, Oct.; b. Lyon: famous bibliophile. He was attached to the court of Francis I., and went to Italy as intendant-gen. of the army. He held several high civil posts and distinguished himself at Rome as diplomatist. He was a scholar and a powerful patron of men of learning. He died at Paris. Grolier's library has made him famous. He acquired choice copies of the best works, and had them magnificently and tastefully bound, with the generous inscription, *Io. Grolierii et Amicorum* ('John Grolier's and his Friends'). The library was dispersed 1675, since which time volumes belonging to it are a great prize of wealthy book-collectors. Very large sums have been paid for single books.

GROMET, n., or GROMMET, n. *grŏm'ĕt* [F. *gourmette,* a curb]: among *seamen,* a ring formed of a twist of rope laid in three times round.

GROMWELL, n. *grŏm'wĕl* [OE. *gromell:* etymology unascertained.] (*Lithospermum*): genus of plants of nat. ord. *Boragineæ,* having a funnel-shaped corolla, stamens shorter than the corolla, and *achenia* of stony hardness. Probably, on account of the last-mentioned character,

extraordinary virtues were ascribed to them, particularly to the COMMON GROMWELL (*L. officinale*), in the cure of stone in the bladder: the virtues were merely imaginary. The Common Gromwell is a native of dry gravelly places in Europe, Asia, and N. America. It has an erect much-branched stem, broadly lanceolate leaves, and small greenish-yellow flowers.—CORN GROMWELL (*L. arvense*) with small white flowers, is of equally wide geographic distribution.—Two species, natives of s. Europe, *L. tinctorium* and *L. anchusoides*, yield a dye-stuff similar to alkanet, and which passes under that name.

GRONINGEN, *grōn'ĭng-ĕn*, D. *ċhrō'nĭng-ċhĕn* (ancient *Cruoninga*): northeastern province of the Netherlands, bounded n. by the North Sea, e. by Hanover, s. by the province of Drenthe, w. by that of Friesland; 896 sq. m. It is watered by the Hunse, navigable for large vessels from the town of Groningen to its mouth in the Lauwer Sea, and by other small streams, and by lakes and numerous canals. Its surface is flat, protected against the sea on the n. by dykes. The soil, principally alluvium, forms excellent arable land. The n. of the province contains the best soil, and is one of the most densely peopled districts of the kingdom. Much of the land (toward the s.e.) is marshy, and lies in pasturage, which supports a fine breed of cattle, and great numbers of highly valued horses and sheep. Farming and grazing are chief pursuits of the people; fishing, commerce, and trade also are carried on, and some manufactures. Ship-building is extensive, and much butter is exported. The people are almost entirely of the Frisian race, and belong to the Reformed Church. Pop. (1901) 305,781.

GRON'INGEN: important fortified town of the Netherlands, cap. of the province of Groningen; on the Hunse, at confluence with the Aa 22 m. w. of Dollart Bay. It is nearly circular in form, surrounded by walls and a fosse, and traversed by canals crossed by 18 bridges. The Hunse is here converted into a canal, navigable for large vessels, about 600 of which visit the town annually. The great market-place is 662 ft. long and 389 ft. broad, and contains the beautiful Gothic church of St. Martin's, with a noble tower 343 ft. high. The university founded 1614, has a library, botanic garden, and cabinet of natural history. Groningen has railway communications with Friesland, Germany, and southward to all the Netherlands towns. The port of Groningen is good; it communicates by canals with Dollart Bay on the e., with the Lauwer Sea on the n.w., and with the entrance to the Zuider Zee at Harlingen on the west. There are ship-building yards and paper-mills. Pop. (1901) 68,440.

GRONOVIUS, *gro-no'vĭ-ŭs*, or GRONOV, *gro'nŏv:* family of classical scholars of German extraction, settled in Holland.—The most famous are JOHANN FRIEDRICH GRONOVIUS (1611–71), b. Hamburg, prof. at Leyden 1659.

He published editions of many of the classical authors.—His son, JACOB GRONOVIUS (1645–1716) also prof. at Leyden, likewise edited classics, and left a *Thesaurus Antiquitatum Græcarum.* Two sons of Jacob Gronovius and a grandson were distinguished scholars.

GROOM, n. *grôm* [Dut. *grom,* a youth; *grome,* a lover: OF. *gromme,* a servant]: a man or boy who has the charge of horses; a man about to be married or who has been recently married—more usually called a *bridegroom:* V. to tend and clean, as a horse. GROOM'ING, imp.: N. the care and feeding of horses. GROOMED, pp. *grômd.* GROOM'S-MAN, an attendant of a bridegroom at his wedding—familiarly called *best man:* see BRIDE. GROOM IN WAITING, GROOM OF THE CHAMBER, certain officers of the English royal household. GROOM OF THE STOLE: see STOLE 1.

GROOT, *grōt,* GERHARD; or GERHARD THE GREAT (other forms GROOTE or GROET or GROETE, *Gerrit* or *Geert*): 1340, Oct.—1384, Aug. 20; b. Deventer, Holland: founder of the Soc. of Brethren of the Common Life. He studied at Deventer, Aix-la-Chapelle, and Cologne, and graduated at the Univ. of Paris 1358 with high honors in theology, philosophy, law, medicine, and astrology. He then taught theology and philosophy in Cologne, obtained several rich benefices though not in holy orders, visited the papal court at Avignon, was lauded wherever known for his profound learning, and began living in a state of great luxury. In 1374 he was convinced of the vanity of his life, renounced all worldly enjoyments, resigned his benefices, spent 3 years in study and prayer in the Munnikhuizen monastery, was ordained deacon, and became a missionary preacher within the diocese of Utrecht. He translated the Psalms and the Dutch office into Dutch, established the soc. of 'Brethren and Clerks of the Common Life' for transcribing MSS. copies of the Bible and the writings of the fathers, and obtained for it the pope's sanction 1376. The first monastery was built 1386 and by 1460 there were 150. The soc. was dissolved at the time of the Reformation.

GROOTE EYLANDT, *grō'tėh ī'lânt* (English, *Great Island*): off the w. coast of the Gulf of Carpentaria, N. Australia; largest island in that vast inlet, lat. 14° s., long. 136° 40′ e. Its extreme length and breadth are about 40 m. each. The center is mountainous, and the shores are dry and barren.

GROOVE, n. *grôv* [Dut. *groeve,* a furrow: *grubc,* a pit—from *graben,* to dig]: a furrow; a channel or long hollow cut by a tool: V. to furrow; to cut a channel with an edged tool. GROOV'ING, imp. GROOVED, pp. *grôvd.*

GROOVING or FURROWING: the cutting or corroding which takes place in the seams of improperly stayed boiler plates. It is partly due to the leverage to which those parts are subjected, and partly to the action of acids in the lines of strain.

GROPE, v. *grōp* [Sw. *grabba;* Icel. *gripa,* to gripe, to grasp: Pol. *grabic,* to seize, to rake: connected with GRAB and GRASP]: to feel one's way, as with the hands, or as a blind man; to search or attempt to find, as in the dark. GRO'PING, imp. GROPED, pp. *prōpt.* GRO'PER, n. one who. GRO'PINGLY, ad. *-lĭ.*

GROS, *grō,* ANTOINE JEAN, Baron: 1771, Mar. 16—1835, June; b. Paris: French historical painter. He studied in the school of David, and acquired celebrity by his picture of Bonaparte as the Victor of Arcola. Bonaparte was so much pleased with the work, that he appointed Gros a member of the commission to collect the objects of art which had been ceded to France by the treaty of Tolentino. Gros's first great achievement, however, was the *Pestiférés de Jaffa* (The Plague-smitten at Jaffa), executed at Versailles 1804. It excited prodigious enthusiasm, the author being carried in triumph to the saloon of the Louvre, where the picture was crowned in his presence. Other important works by Gros during the consulate and the empire are: *Bonaparte aux Pyramides, Le Combat d'Aboukir, La Bataille de Wagram, Charles-Quint reçu à Saint-Denis par François Ier.* After the return of the Bourbons, Gros painted among other pictures, *Le Depart Nocturne de Louis XVIII., au* 20 *Mars* 1815, *La Duchesse d'Angoulême s'embarquant à Pauillac,* and *Charles X. au Camp de Reims.* He finished 1824, an immense work for the cupola of the church of St. Geneviève in Paris, begun 1811, to which, say his countrymen, 'there is nothing comparable.' It is not a fresco, but a painting in oil on a peculiar kind of plaster representing the four great dynasties of France doing homage to the tutelary genius of the nation. Charles X. was so charmed with the work, that he raised Gros to the dignity of a baron, and doubled the sum which the painter had originally stipulated for. The rise of the romantic school bore away from him the tide of popularity: and Gros felt the ebbing of his fame acutely, and took refuge in dissipation, and, it is suspected, committed suicide in a fit of profound chagrin. At all events his body was drawn out of the Seine near Meudon, 1835, June 25. Gros's paintings all are marked by strength of effect, and dramatic movement in the scene; they are however, deficient in delicacy and sentiment, and exhibit only ordinary imagination.

GROSBEAK, or GROSSBEAK, n. *grōs'bēk* (Fr. *grosbec,* large beak], (*Coccothraustes*): genus of birds of the family of *Fringillidæ,* distinguished chiefly by the great thickness of the bill, which has also a proportionate strength, and notwithstanding the small size of the birds, is used for breaking the stones of cherries, olives, etc. The hawfinch (q.v.) and greenfinch (q.v.) are the European species; but some are found in other parts of the world, as the beautiful EVENING GROSBEAK (F. *vesper-*

tina) and the ROSE-BREASTED GROSBEAK (F. *Ludoviciana*) in N. America. For some allied species usually assigned to the family of finches (see FINCH) or *Fringillidæ*, see CARDINAL BIRD; PINE-FINCH; also WEAVER-BIRD.

GROSCHEN, n. *grŏsh'n:* a small silver coin of Germany, worth about two cents.

GROSE, *grōs*, FRANCIS: 1731–1791, June 12; b. Greenford, England: antiquary. He received an excellent education, became a proficient draughtsman, and for a time was employed in the Herald's College. In 1757 he was elected a fellow of the Soc. of Antiquaries, 1773–87 published his *Views of Antiquities in England and Wales*, 1789 made an antiquarian tour of Scotland, 1790 began publishing the results of this tour, and 1791 had started on a similar tour of Ireland, when he died suddenly of apoplexy in Dublin.

GROSE, WILLIAM, American soldier and politician: b. Dayton, Ohio, 1812; d. 1900. He resigned his position as judge of the court of common pleas in 1861 to recruit and take command of the 36th Indiana regiment of infantry, and commanded a brigade in the battles of Murfreesboro, Chickamauga, and Chattanooga. He was commissioned brigadier-general 1864, July 30, and at the battle of Nashville, 1864, Dec. 15 and 16, he commanded the Third brigade in General Thomas's army. In 1865 he was brevetted major-general of volunteers. He was State senator from 1879 to 1883.

GROS-EM, n.: silver coin, used in Switzerland, of the value of about one dollar and fifteen cents.

GROSS, a. *grōs* [F. *gros*—from mid. L. *grossus*, thick—from L. *crassus*, thick: comp. Gael. *graosda*, filthy, obscene]: thick; fat; corpulent; coarse; rude, indelicate; impure; unrefined; great, as gross ignorance; whole or entire: N. the whole taken together; the whole weight of goods, including box, package, or such like; the mass. GROSS'LY, ad. *-lĭ*, in a gross manner; coarsely; shamefully; palpably. GROSS'NESS, n. coarseness; thickness; greatness; unwieldy corpulence; want of refinement or delicacy. GROS'SIFICA'TION, n. *-sĭ-fĭ-kā'shŭn* [F. *facĭō*, I make]: in *bot.*, the process of swelling in the ovary after fertilization. GROSS AVERAGE, the average upon the gross or entire amount. BY THE GROSS, by the whole weight or bulk. IN THE GROSS, in the bulk; with all parts taken together.—SYN. of 'gross, a.' large; aggregate; bulky; rough; stupid; vulgar; low; obscene; dense; palpable; whole; total; entire; shameful; unseemly; enormous; heavy; oppressive.

GROSS, n. *grōs* [F. *grosse*—from *gros*, large]: twelve dozen or 144 articles. GREAT GROSS, 12 gross.

GROSS, *grōs*, CHARLES, American historian: b. Troy, N. Y., 1857, Feb. 10. After graduating from Williams College in 1878, he pursued his studies at Göttingen,

and was engaged in literary work in England 1884–87. Since 1888 he has been instructor and professor of history at Harvard University. A frequent contributor to the *American Historical Review* and other historical journals he has published: *Gilda Mercatoria* (1883); *The Exchequer of the Jews of England in the Middle Ages* (1887); *The Gild Merchant* (1890); *Select Cases from the Coroner's Rolls* (1896); *Bibliography of British Municipal History* (1897); *Sources and Literature of English History* (1900). In addition he has translated: Lavisse's *Political History of Europe* (1891); Kayserling's *Christopher Columbus* (1893).

GROSS, Samuel David, M.D., LL.D., D.C.L.: 1805, July 8—1884, May 6; b. near Easton, Penn.: surgeon. He gradnated at the Jefferson Medical College 1828, began practicing in Philadelphia, removed to Easton 1829, became demonstrator of anatomy in the Univ. of Cincinnati 1833 and prof. of pathological anatomy there 1835, prof. of surgery in the Univ. of Louisville, Ky., 1840; successor to Prof. Valentine Mott in the Univ. of Vt. 1850 and of Prof. Thomas Dent Mütter in Jefferson Medical College 1856 and held the latter office till 1882. He was a founder and the first pres. of the Philadelphia Pathological Soc., was elected a member of the Royal Medical Soc. of Vienna 1862, pres. of the American Medical Asso. 1867, member of the Royal Medico-Chirurgical Soc. of London and the British Medical Assoc. 1868, and pres. of the International Medical Congress at Philadelphia 1876. He received the degree LL.D. from the Univ. of Cambridge and of D.C.L. from the Univ. of Oxford 1872. His published works include *Diseases and Injuries of the Bones and Joints* (1830), *Elements of Pathological Anatomy*, 2 vols. (1839–57) *Wounds of the Intestines* (1843), *Diseases, Injuries, and Malformations of the Urinary Organs* (1851, 1855,76), *Results of Surgical Operations in Malignant Diseases* (1853), *Foreign Bodies in the Air Passages* (1854), *System of Surgery*, 2 vols. (1859; 6th ed, 82), *Manual of Military Surgery* (1861), *History of American Medical Literature* (1875), and *Century of American Medicine* (1876).

GROSSART, n. *grŏs'ĕrt* [OF. *groiselle;* F. *groseille*—from Sp. *grosella*, the fruit of the currant: O.H.G. *kraüsselbeere:* Gael. *groiseid*, a grossart]: in many districts, a familiar name for a gooseberry. Gros'sular, n. *grŏs'ū-lėr*, or Gros'sulaire, n. *-lār*, the name given to the pale gooseberry-green varieties of translucent lime-alumina garnet.

GROSS-DE-NAPLES, *grō-dĕ-nâp'l* [F. *gros*, thick, stout; *de*, of; *Naples*, the town]: a silk fabric like lutestring, but not so stout, made both plain and figured.

GROSSETESTE, *grōs'tĕst*, Robert: celebrated English prelate of the middle ages: abt. 1175-1253, Oct. 9; b.

Stradbrook, in Suffolk. He studied at Oxford, and at Paris. On his return to England, he obtained a great reputation as a divine, and was the first lecturer in the Franciscan school at Oxford. In 1235, he was elected Bishop of Lincoln, and at once commenced a vigorous reformation of abuses in his diocese. The most conspicuous and offensive ecclesiastical sin in Grosseteste's days was the conduct of the pope (Innocent IV.) in church appointments. It was common for his holiness to make grants of vacant benefices in England to Italians, and other foreigners, many of whom, it would appear, never showed face in England, but contented themselves with drawing the revenues of their office. Against this Grosseteste set himself strongly, incurring, by his boldness, a temporary suspension from his episcopal functions, and a continual menace of excommunication. One of these transactions in 1253 has been the subject of much controversy. It is alleged by some writers that Innocent wrote to Grosseteste, ordering his nephew, an Italian youth, to be promoted to the canonry first vacant in the cathedral of Lincoln, accompanying his injunctions with threats. The bishop was filled with indignation, and addressed a letter either to the pope or his agents, in which he declares, that 'if an angel from heaven commanded him to obey a mandate so absurd and sinful, he would not do it,' and compares the nepotism of the pope to the sin of Lucifer and Anti-Christ. Innocent, according to these writers, was violently enraged at his opposition; he excommunicated Grosseteste, and even appointed a successor to the bishopric, but in this instance the thunder of the Vatican was harmless. Grosseteste quietly appealed to the tribunal of Christ, and troubling himself no more about the matter, continued to discharge his episcopal functions. The general feeling of the English nation sustained him; the clergy of his diocese went on obeying him as if nothing had happened; and at his death Abp. Boniface conducted the funeral services. But Dr. Lingard (II. 502) has shown that the mandate came not from the pope, but from the nuncio; that Innocent, on receiving Grosseteste's reply, not only rescinded the order, but adopted measures for the reform of these abusive appointments; and that the story of his having died under a sentence of excommunication rests on very questionable authority. Grosseteste has often been regarded as one of the 'reformers before the Reformation.' It is assumed that because he quarrelled with the head of the church on a matter of discipline, he must have been a 'Protestant.' But nothing could be further from the fact than this assumption. He belonged to that class of minds who look at truth not from the side of *doctrine*, but of *practice*. He would have accepted, with acquiescence, any new doctrine from the Vatican, but a knavish trick was not to be endured, even at the hands of an angel from heaven! It is futile, therefore, to claim him as a

precursor of men like Luther, of Calvin, or Knox. In politics, he was a constitutionalist, and a friend of Simon de Montfort, heartily interested in the preservation and extension of such liberty as England then enjoyed. His learning was prodigious, almost inspiring awe among his contemporaries. Latin, Greek, Hebrew, French, mathematics, medicine, and music were among his attainments. His knowledge of the Scriptures also is particularly lauded. Grosseteste was one of the most voluminous authors that England ever produced. The list of his works, given by Dr. Pegge, of which only a few have been published, occupies 25 closely-printed pages in quarto. For an intelligent estimate of his life and character see Brewer's *Monumenta Franciscana*, and the collection of his letters edited by Luard (1862), *Roberti Grossesteste Episcopi quondam Lincolniensis Epistolæ*.

GROSS NEGLIGENCE: a term used to indicate that the ordinary care which even a thoughtless man might take of his own person or property has in this instance been omitted.

GROSS SECTION: the total number of inches contained in the circumference of a steam boiler.

GROSSULARIACEÆ, *grŏs-ū-lā-rĭ-ā'sē-ē:* natural order of exogenous plants, containing about 100 known species, all shrubs, natives of temperate climates, and chiefly of the n. hemisphere. They have alternate lobed leaves. The calyx is 4—5 cleft, the tube entirely or in part adherent to the ovary; the petals are very small, alternate with the segments of the calyx; the stamens are alternate with the petals, and inserted into the throat of the calyx; the ovary is one-celled, with two opposite parietal placentæ; the fruit is a berry crowned with the remains of the flower, having numerous seeds immersed in pulp, and suspended by long threads; the *testa* externally gelatinous, adhering firmly to the horny albumen. The most important species of the order are the gooseberry (q.v.) and currants (q.v.).

GROSSWARDEIN, *grōs-vâr'dīn* [Magyar, *Nagy-Varad*]: free city, cap. of the co. of Bihar, Upper Hungary; in a beautiful plain, on the Sabes Körös ('the rapid Körös'), 38 m. s.s.e. of Debreczin. It is the seat of a Rom. Cath. bishop, and of a non-united Greek bishop, and consists of the town of Grosswardein proper, and eight suburbs. The town is surrounded by a wall, and was formerly a fortress. The principal buildings are the churches, of which there are 22, including the magnificent cathedral. There is great trade, especially in pottery, in cattle-rearing, and in the cultivation of the vine. There are several distilleries. The town is connected by railway with Vienna. Grosswardein was taken and pillaged by the Turks 1660, and by the Austrians 1692. Pop. (1900) 50,177.

GROSVENOR, *grō'vc-nor,* Edwin Augustus, American educator and author: b. Newburyport, Mass., 1845, Aug. 30. He was graduated at Amherst College in 1867 and at Andover Theological Seminary in 1872, was professor of history at Roberts College, Constantinople, in 1873–90; and of European history at Amherst College in 1892–9. In 1899 he was appointed to the newly established chair of modern governments and their administration. His publications include translations from the French of Victor Duruy's *Modern Times* (1894) and *General History* (1898); *The Hippodrome of Constantinople* (1889); *Constantinople* (1895); *The Permanence of the Greek Type* (1897); *Contemporary History* (1899), extending from 1848 to the present time; etc.

GROS VENTRES, *grō vĕnt'r* [Fr. Big Bellies]: name of two distinct tribes of American Indians: 1, the Gros Ventres of the Mo., or Minnetaries, or Hidatsa, formerly a branch of the Crows, latterly living with the Mandans, and great enemies of the Sioux; since 1870 dwelling on the reservation on the frontier of Montana; 2, the Gros Ventres of the prairies, part of the Arrapahoe family, living in amity with the Blackfeet tribe on a reservation of 17,000,000 acres in Montana between the Mo. and Milk rivers; they number about 1,800.

GROT, n. *grŏt,* or Grotto, *n. grŏt'tō* [F. *grotte;* It. *grotta,* a cave, a den—from mid. L. *crupta* and *grupta*—from L. *crypta,* a vault]: a cave; a cool recess or excavation; a summer-house in a garden of a particular form and ornamented, as with shells, etc. Grot'toes, plu. *-tōz.*

GROTE, *grōt,* George, D.C.L., LL.D.: historian of Greece, also statesman and philosopher: 1794, Nov. 17—1871, June 18; b. Clay Hill, Beckenham, Kent, England. His grandfather, Andrew Grote, native of Bremen, settled in London as a banker in the beginning of the 8th c. His mother was daughter of the Rev. Dr. Peckwell, chaplain to the Countess of Huntingdon; and her mother was an Irish lady, descended from a Prot. member of an old French family in Touraine. Grote was educated at Charter-House, and at the age of 16 entered his father's banking-house, employing all his leisure in study. In 1823, he began to amass materials for a history of Greece. Previous to 1832, he wrote on parliamentary reform, and threw himself into the agitation for the Reform Bill. After the passing of the bill he was elected, at the top of the poll, a representative of the city of London in parliament, and continued a member of the house of commons till 1841. His parliamentary career was distinguished chiefly by his annual motion for the ballot, but he spoke with great effect on many other questions. In 1843, he retired from the banking house, and applied himself to his history; the first two vols. appeared 1846, and the last (12 in all) 1856. He forthwith commenced the study of Greek

philosophy, and in 1865 brought out his work on Plato. The remainder of his studious life was devoted to Aristotle, but he executed only a part of what he intended. After his death, appeared what he had composed on Aristotle; also a collection of essays, entitled *Minor Works;* and, 1876, *Fragments on Ethical Subjects. The Personal Life of George Grote* was written by Mrs. Grote, who wrote also other works. She was remarkable for personal beauty, and for intellectual powers and social gifts of unusually high order: she was her husband's constant companion in study. She survived him more than seven years. Grote spent much of his time, in later years, in the management of the great unsectarian educational institutions—University College and the Univ. of London—being at the time of his death pres. of one, and vice-chancellor of the other.

GROTEFEND, *grō'tĕh-fĕnt*, GEORGE FRIEDRICH: 1775, June 9—1853, Dec. 15; b. Münden, Hanover; philologist. He was educated in Münden, Ilfeld, and the Univ. of Göttingen, became asst. master of the gymnasium there 1797, published his first work *De Pasigraphia sive Scriptura Universali* 1799, and was soon afterward appointed rector of the Frankfort gymnasium. In 1815 he published *Anfangsgründe der deutschen Poesie;* 1817, founded a soc. for investigating the German language; 1821 was appointed director of the Hanover gymnasium; 1823-4 published his revised edition of Wenck's Latin grammar, 2 vols., 1835–38 *Rudimenta Linguæ Umbricæ ex Inscriptionibus antiquis enodata*, 8 parts, 1839 *Rudimenta Linguæ Oscæ*, and 1840–42 *Zur Geographie und Geschichte von Altitalien*, 5 parts. He also contributed largely to Ersch and Gruber's cyclopedia. Original and important as were his investigations of the Latin, Italian, and German tongues, what is considered the greatest achievement of his life were his patient and successful efforts to discover the key for deciphering the cruciform inscriptions. He took up the study of the Persian inscriptions prior to 1800 and in that year communicated his first discovery to the Royal Soc. of Göttingen. In 1815 he elaborated it in Heeren's work on ancient history, 1837 published his *Neue Beiträge zur Erläuterung der persepolitanischen Keilschrift*, and 1840 *Neue Beiträge zur Erläuterung der babylonischen Keilschrift.* He demonstrated that the Persian inscriptions contained three forms of writings, that the characters were alphabetic not syllabic, that they should be read from left to right, and that the alphabet contained 40 letters, including signs for long and short vowels.

GROTESQUE, a. and n. *grŏ-tĕsk'* [F. *grotesque*, odd—from *grotte*, a grotto: It. *grottesco*]: *literally*, the style in which grottoes or vaults were ornamented. So named in the 13th c., when rediscovered in Roman excavations. This style abounds in all kinds of transformations, from the animal to the vegetable, and mingles all the natural kingdoms in fanciful and picturesque confusion. The

name *grotesque* thus came by degrees to mean a fanciful combination of natural ideas as applied to ornament. Thus, all the animal and vegetable *inventions* of the mediæval artists are grotesques. Some of these are very beauti-

Grotesque.

ful, and other very picturesque; and, generally, an idea of some value, such as boldness, fierceness, dignity, etc., is expressed. In this mode of application, the grotesque is a valuable quality in art; it is when it becomes debased, as in the monstrosities of the Renaissance, that it becomes extravagant, whimsical, ludicrous—with which meaning it is commonly used. GROTESQUE'LY, ad. *-lĭ*. GROTESQUE'NESS, n.

GROTIUS, *grō'shĭ-ŭs*, HUGO (Dutch, *Huig van Groot*): 1583, Apr. 10—1645, Aug, 29; b. Delft; son of Jan de G., burgomaster of the town and curator of the Univ. of Leyden. In his 11th year G. entered the Univ. of Leyden, where he studied under Joseph Scaliger. He was a prodigy of precocious genius. In his 15th year he took his degree. In the following year he accompanied Olden Barneveldt, the grand-pensionary, on his embassy to France, where, notwithstanding his extreme youth, he gained the favor of Henry IV On his return, he began to practice as a lawyer; and 1607 was appointed fiscal-gen. and 1613 council-pensionary at Rotterdam. But the disputes between the Remonstrants (see ARMINIUS) and their opponents were now at their height in Holland; Olden Barneveldt had the misfortune to be the protector of the former, and G. also supported them by his writings and favor. These religious, or rather theological strifes had a *political* significance also; the consequence was, that both Olden Barneveldt and G. were arrested, tried, and condemned by the dominant party under Prince Maurice (see BARNEVELDT). Olden Barneveldt was beheaded 1619, and G. sentenced to imprisonment for life in the castle of Lovenstein. He escaped, however, by the contrivance of his wife, who managed to have him carried out of the castle in a chest used for the conveyance of books and linen, while she remained in prison in his stead. Her devotion impressed even his stern masters, and she was set at liberty.

For some time, G. wandered about in the Rom. Cath. portion of the Netherlands, and finally escaped to France, where Louis XIII. bestowed on him a pension of 3,000 livres; but not paying sufficient court to Richelieu, he lost the king's favor, and 1631 his pension was withdrawn. A friendly letter from Prince Frederick of Orange induced him to return to his native country; but by the intrigues of his enemies, sentence of perpetual exile was soon passed

upon him. He removed to Hamburg, and, while there, received invitations from the kings of Denmark, Poland, and Spain; but the protection promised him by the Chancellor Oxenstiern, and Queen Christina's taste for literature, induced him to enter the Swedish service 1634. As ambassador at the French court (1635–45), he gained universal respect. On his return to Sweden, he passed through his native country, and was received in Amsterdam with most distinguished honor. Equally flattering was his reception by the Swedish queen; but the literary dilettantism of Christina's court did not suit so serious and solid a scholar, whose thoughts were always of the broadest and most forecasting nature. Besides, the climate of Sweden did not agree with him, and he was probably longing to spend the evening of his life in his native land. In consequence, he sent in his resignation of office to the queen, who, when she found that nothing could induce him to stay, presented him with a sum of 10,000 crowns and some costly plate, besides placing at his disposal a vessel to conduct him down the Baltic to Lübeck. A storm compelled him to land on the coast of Pomerania. While proceeding toward Lübeck, he was seized with a fatal illness, and died at Rostock.

To the talents of a most able statesman, G. united deep and extensive learning. He was a profound and enlightened theologian—perhaps the best scriptural exegete of his day, a distinguished scholar, an acute philosopher, a judicious historian, and a splendid jurist. Altogether, he was what Ménage called him, 'a monster of erudition.' His metrical translations from the Greek authors reveal superior poetical powers; he was one of the best modern writers of Latin verse, and likewise composed poems in the Dutch language. In spite of his broken, wandering, and checkered career, G. found time to write a great variety of works. The first was the *Mare Liberum*, in which he defended the freedom of the Dutch E. India trade. His chief work, however, is that entitled *De Jure Belli et Pacis*, translated into all the languages of Europe. It may be considered the basis of international law, and has long been a text-book in many universities. Among his other works are: *Annales et Historiæ de Rebus Belgicis* (Amsterdam 1657), written in a style that equals Tacitus for concise and pointed power; *Annotationes in Vetus Testamentum* (Paris 1644); *Annotationes in Novum Testamentum* (Paris 1644); *De Satisfactione Christi; De Veritate Religionis Christianæ* (Leyden 1627), translated even into several Oriental languages, and remarkable for its clear arrangement, vigorous logic, and eloquent style. It is reckoned one of the best 'apologies' for Christianity in modern times. G., though a deep student of theology, was not strongly drawn to merely dogmatic propositions for their own sake. His mind was comprehensive, his nature tolerant, and his thought was to seek some scheme of mutual compromise and accommodation between the Calvinistic and Arminian parties. To this also he was moved by his profound sentiment of Christian piety. But even had the Remonstrants been ready for such a course, the Calvinists of his land and

times counted toleration in matters of doctrine a deadly sin.—Compare Butler, *Life of Grotius* (London 1826); De Vries, *Huig de Groot* (1827); Creuzer, *Luther and Grotius* (1846); works by Hartenstein (1850) and Caumont (1862); and Hély, *Etude sur Grotius* (1875).

GROTON, *grăw'ton*, Conn.: town in New London co., on the Thames river, and the N. Y. N. H. & H. railroad, opposite the city of New London. It is a place of considerable historic interest. Here, in 1637, Capt. Mason stormed a fortress held by the Pequot Indians, and many were killed on both sides. During the Revolutionary War the Americans established a fort there which was called Fort Griswold, and in 1781, being garrisoned by a force of 150 militiamen, it was assaulted by 800 British troops under Benedict Arnold. The Americans, although resisting with heroism, were overwhelmed by numbers, and Arnold and his men pushing their way into the fort butchered 85 men and wounded 65 others, 35 of the latter subsequently dying of their wounds. In consequence of this outrage this battle is known in history as the "Massacre of Fort Griswold." The town has shipbuilding yards, a number of manufactories, and the Bill Memorial Library. Pop. (1910) 6,495.

GROTON: town, Middlesex co., Mass.; on the B. & M. r.r., 14 m. w. of Lowell. Has an acad., public library and two weekly papers. A portion was incorporated 1870 as the town of Ayer. Pop. (1910) 2,155.

GROTTA DEL CANE, *grōt'tâ dĕl kâ'nā* (*Grotto of the Dog*): noted cave near Naples, in the vicinity of Lake Agnano and of Puzzuoli. It is about 10 ft. long, 4 ft. wide, and 9 ft. high, and is so full of carbonic acid gas, especially near the floor, that little animals introduced into it soon die, and tapers placed near the ground are extinguished. It derives its name from the practice of introducing small dogs, which are soon almost deprived of life by the gas, but recover when restored to the open air.

GROTTO: see GROT.

GROUCHY, *grô-she'*, EMMANUEL, Marquis DE: 1766, Oct. 23—1847, May 29; b. Paris: general. He entered the French army 1781, was a lieut. in the royal body guard 1787-93, served with Lafayette, was promoted brig.-gen., commanded the cav. in the army of the Alps, aided in the conquest of Savoy, and after fighting in La Vendée 1794 was cashiered with all other officers of the nobility. He then enlisted as a private soldier, and after the fall of Robespierre was reinstated and promoted gen. of div. by a special decree. In 1798 he persuaded the king of Sardinia to abdicate and surrender Piedmont to France; 1799 received 14 wounds and was taken prisoner at Novi; gained his liberty after Marengo, served with Moreau on the Rhine, and was promoted inspector gen. of cav.; defeated the Prussian cav. at Zehdenik 1806, Oct. 26; was gov. of Madrid 1808, took part in the battle of Wagram 1809, commanded

the emperor's body-guard on the retreat from Moscow. On the restoration of the Bourbons he was banished from France, but a year later (1815) was permitted to return; and when Napoleon reappeared from Elba, Grouchy was given a command and made a marshal of France for his successes in the north. He then marched into Belgium, defeated the allied English and Prussian armies at Fleurus and Ligny June 16; and by following Napoleon's orders to the letter to pursue Blücher is believed to have caused the French defeat at Waterloo, when, had he followed the advice of his generals, he might at a critical moment, by joining Napoleon, have effected the defeat of the allies. He was again banished by the Bourbons, lived 5 years in Philadelphia, was recalled to France 1821, and after the revolution of 1830 was restored to rank as marshal and created a peer.

GROUE, v. See GRUE.

GROUND, n. *growud* [Goth. *grundus;* Dut. *grond;* Icel. *grunnr;* Pol. *grunt;* Ger. *grund;* Gael. *grunnd,* ground]: the earth or soil, as distinguished from air or water: the surface or upper part of the earth's soil; territory or region; the mass of the earth, considered as an electric conductor; a return circuit provided through the ground; a fault or leak of electricity to ground through a defect in the insulation of a conductor; estate or possession; that which supports anything; fundamental cause; place of any contest; primary reason; in a *painting,* the primary or principal color; fundamental substance: in *OE.,* a tune or plain song; foil: V. to lay or place on the ground; to settle in first principles; to fasten or strike on the bottom, as a ship in too shallow water. GROUND'ING, imp. GROUND'ED, pp. fixed on the ground, as a ship; thoroughly instructed. GROUND'AGE, n. *-āj,* toll for lying in port. GROUND'EDLY, ad. *-lĭ,* upon good grounds. GROUND'LESS, a. without foundation; false. GROUND'LESSLY, ad. *-lĭ,* without just cause or reason. GROUND'LESSNESS, n. want of just cause or reason. GROUND'LING, a fish that keeps at the bottom of the water: a spectator in the pit of a theatre. GROUNDS, n. plu. *growndz* [Gael. *grunndas,* lees, dregs—from *grunnd,* ground]: dregs or lees; in *arch.,* pieces of wood let in flush with the plastering for which they serve as a guide, and to which the moldings and other finishings are nailed. GROUND-BAIT, bait thrown into the water to assemble fish. GROUND-FLOOR, the lowest floor of a house, on a level with the outside ground. GROUND-GAME, wild animals such as hares and rabbits, as distinguished from winged-game. GROUND-ICE, or ANCHOR-ICE, ice formed under peculiar circumstances at the bottom of running or shallow water; often found in the Baltic Sea. GROUND-NUT, a seed—the pea-nut or American earth-nut, of nat. ord. *Leguminosæ* (see ARACHIS): also a tuber—the pig-nut or earth-chestnut

(see EARTH-NUT). GROUND-PLAN, the plan of the lowest floor of a house. GROUND-PLATE, in *arch.*, the piece of timber which forms the lower part of a timber building, also called a sill. GROUND-SWELL, the heavy swelling and surging of the sea after a storm, or as indicating an advancing storm. GROUND-TACKLE, in a *ship*, all the ropes, etc., connected with the anchors and mooring apparatus. GROUND-WORK, the foundation or basis of anything; first principles; fundamentals. TO FALL TO THE GROUND, to come to nothing; to be unsuccessful. TO GAIN GROUND, to advance; to have some success. TO LOSE GROUND, to give way; to go back; to retire.—SYN. of 'ground, n.' dust; earth; estate; land; field; possession; foundation; bottom; basis; premise; reason; datum; surface; floor; soil.

GROUND, in Painting: coating or preparation put on the surface of the panel, board, or canvas on which a picture is to be painted. Artists attach great importance to the color and texture of the ground, as largely effecting the technical quality of the work. In forming an opinion on paintings attributed to old masters, the kind of ground used is always taken into consideration, for in different epochs and schools, particular grounds were used. The works of the Italian school preceding and during the time of Raphael all were painted on white grounds, and almost always on panels, even when the works were large, and many pieces had to be joined. The preparation was composed of *gesso*, plaster of Paris, or chalk mixed with size, and the ground was of course absorbent. Afterward, when canvas came to be generally used, the works of the Italian and Spanish schools generally were painted on an oil ground of dull red color; and when this was not covered by the artist with a thick *impasto* or body of paint, the picture was apt to become black and heavy, a fault very marked in the works of the school of the Carracci and of the Neapolitan and later Roman schools. The works of the Dutch and Flemish masters, which are distinguished for brilliancy and transparency, were painted on light grounds, varying from white to gray, and their practice is generally followed in modern schools. The term *ground* is applied also to different parts of a picture as the *foreground*, or portion of the picture on which are placed the figures or objects represented as nearest the spectator; *background*, the part, particularly in portraits, behind or on which it is intended to set off or relieve the head, figure, or group depicted.—The portion of a model or carving from which the figures are projected, also is styled the ground.

GROUND BEETLES: the family *Carabidæ*, predatory beetles of various sizes and appearance. It contains upwards of 1,200 described species, nearly all of nocturnal habit, and, consequently, dark, mostly black in color. Some species, however, are metallic green or

blue, or beautifully variegated. The family contains many beneficial species, which roam fields, meadows and gardens, destroying many injurious pests. They fly freely at night, and seek concealment in the daytime under stones and logs and in other convenient hiding-places. Most species are terrestrial, but a few forms, such as species of *Calosome*, known as 'caterpillar-hunters,' climb the trunks of trees in search of noxious caterpillars which they destroy. A remarkable genus is that of the bombardier beetles. A very few are occasionally injurious, among them *Agonoderus pallipes*, which burrow into newly planted seeds of corn; and two species of *Harpalus* which are destructive to strawberries. These latter insects are interesting because of their dual habit of being carnivorous as well as herbivorous. They attack, in the beetle stage, the seeds of Ambrosia, and also eat insects of various kinds.

GROUND-CHERRY, herbaceous plants of the potato family, constituting the genus *Physalis*, scattered through most of the world. About 35 species are natives of the United States, and some are known as 'tomato strawberries,' and are cultivated for the sake of their berry-like fruit, which is hidden within a persistent red calyx.

GROUND DOVE AND GROUND PIG'EON: those birds of the family *Columbidæ* which in characters and habits approach most to the ordinary gallinaceous type. They have short and rounded wings, with much inferior power of flight to pigeons in general; their legs are longer, and their feet adapted rather for walking than for grasping. They are little arboreal in their habits, but live mostly on the ground. Many of them run very quickly. They have not in general much brilliancy of plumage, but among them are the beautiful Bronze-wings (q.v.) of Australia.

GROUND, ELECTRIC: any fault in a coil or circuit, which allows the wire to make contact with some external conductor such as the earth, the wire of another circuit, or a part of the machine frame.

GROUND HOG. See WOODCHUCK.

GROUND-IVY (*Gleehóma hederaeea*, united with the genus *Népeta* by some botanists as *N. Gleehoma*): plant of nat. ord. *Labiatæ*, growing in waste places, plantations, hedges, etc., in a dry soil. It has a creeping stem, kidney-shaped crenate leaves, and axillary blue flowers growing in threes. The flowers have four ascending stamens, two long and two short, a 15-nerved 5-toothed and equal calyx, the anthers before bursting approaching in pairs and forming a cross. A tea prepared from the leaves is in great repute among the poor in many places, and the plant is stimulant, aromatic, and of use in pectoral complaints. The leaves were formerly used in England for clarifying and flavoring ale, which was

then called Gill-ale or Gell-ale, from Gill or Gell, an old name of this plant (which was called also alehoof or tunhoof), but this use has been discontinued since the introduction of hops.

GROUND-LAUREL, or MAYFLOWER. See *Epigœa Repens.*

GROUND'LING (*Botia tœnia*): small fish of the family *Cyprinidœ*, found in some of the rivers of England. It is never more than three or four inches long. It habitually keeps close to the bottom. It is probably often mistaken for the Loach (q.v.), which it much resembles; but, besides its smaller size, it is of a much more compressed form, and is distinguished particularly by a forked spine beneath each eye. These have been made generic distinctions. Several species having these characters are found in the Ganges.

GROUND-PINE: popular name of the *Ajuga chamœpitys*, which is not of the pine but the mint order, and called pine from its resinous smell; also of the *Lycopodium clavatum*, an evergreen vine sometimes reaching a length of 3 yards and called sometimes mare's tail; also of a third species known as club moss, a beautiful tree-like plant usually reaching a height of 8 inches.

GROUND-RENT, in Law: rent which a person, who intends to build on a piece of ground, pays to the landlord for the use of the ground for a certain specified term, usually 99 years. The usual arrangement between the owner of the freehold of land and a speculating builder, is of this kind. The builder pays a certain annual sum by way of rent to the owner who is thereafter called the ground-landlord, and then commences to build upon the land. The builder then lets the houses and in doing so he of course includes in the rent which he puts on each house a proportionate part of this ground-rent, which he himself is bound to pay to the ground-landlord, so that practically the tenant pays both the rent and the ground-rent, the latter being so-called because it issues out of the ground, independently of what is built upon it. Ground-rents often form a safe investment for capital, because the security is good. This security consists in the ground-landlord being able, whenever his ground-rent is in arrear, to dispossess the tenant and resume possession of the premises; and as the ground-rent is usually a small sum, he can scarcely fail to recover its full amount. This power to dispossess exists whether the tenant has paid his rent to his own landlord or not; but if at any time the tenant has been obliged to pay the ground-landlord the ground-rent, which it is the duty of his own landlord in general to pay, he may deduct such sum from the next rent that he pays, or, as it is called, may set off the one against the other so far as it will go. Strictly speaking, there are thus two landlords: the ground-landlord is the over-

landlord, and has the paramount security; the other landlord is landlord to the tenant who actually occupies, but is himself tenant to the ground landlord, for he merely holds a lease. He is what is called a mesne landlord. At the end of the 99 years, or whatever other term is fixed upon, the whole of the building becomes the property of the ground-landlord, for the interest of the builder or his assignees then lapses by effluxion of time, and as the building is a fixture, and cannot be carried away, it thus falls in to the landlord.—Ground-rent corresponds to *feu* in Scotland, with this difference, that the feu-rent in the latter case lasts forever, there being no definite term fixed for its ceasing.

GROUND'SEL [AS. *grund*, ground; *swelgan*, to swallow]: common name of those species of *Senecio* (q.v.) which have small heads of flowers either destitute of ray or with the ray rolled back. The COMMON GROUND'SEL (*S. vulgaris*), one of the most plentiful of weeds in waste and cultivated, grounds in most parts of Europe, is usually destitute of ray. It is a coarse-looking annual, of rapid growth, about 12 inches high, branched, with pinnatifid leaves, and small yellow heads of flowers; flowering at all seasons, even in winter, when the weather is mild; and its seeds, like those of other *Compositæ*, are widely diffused by means of their hairy pappus, being wafted about by the wind. It has a rather disagreeable smell; but birds are very fond of the young buds and leaves, and cage-birds are fed on them. It has a saltish taste, whence its name. Its leaves, beaten into a coarse pulp, and externally applied to the stomach, cause vomiting some hours after their application; it also makes a good poultice for boils and sprains.—Other species are weeds of very similar appearance, but are stronger, have a more disagreeable odor, and are viscid to the touch.—Like other annual weeds, the groundsels are to be hoed down or pulled as they appear, when the ground is in crop.—The groundsel tree, *Baccharis halimifolia*, is a composite shrub, 6–12 ft. high, with angular branches, leaves usually obovate and scurfy, and flowers like those of common groundsel but larger. It is a native of the sea-coast from Mass. southward.

GROUND-SLOTHS, a family (*Megatheriidæ*) of extinct edentates, related to the modern sloths, but of terrestrial habits, and, in respect to many of them, of gigantic size, which are of special interest because some survived into the human period. They exhibit the head and teeth of a sloth, associated with the vertebræ, limbs and tail of an ant-eater. They were chiefly South American, but spread as far as North America in the Pliocene and Pleistocene epochs, and became extinct in very recent, but probably prehistoric times. *Megatherium* is the largest and most familiarly known genus; it almost equalled an elephant in size, and surpassed one in its massive proportions. *Lestodon*, *Mylodon*, *Scelidotherium*,

and *Megalonyx*, were smaller but more common forms. The discovery of part of the hide of one of these animals, genus *Glossotherium*, in a cave at Last Hope Inlet, Patagonia, showed that their skin was thick, studded with small embedded bony nodules, and thickly covered with long, coarse, yellowish-brown hair, as well preserved as are the feathers of the moas in New Zealand. The skin, says the discoverer, Dr. Moreno, of Buenos Ayres, shows patches of red color, suggesting of course blood-stains; and when small bits were chemically analyzed they yielded serum and the substances of glue. In view of this it seems impossible to believe that the skin can be of any great age, for bacteria would have finished their work upon the serum and gelatine long ago. An equally fresh-looking skull was found, as though in a small stone enclosure, and wounded in such a way as only man could have inflicted; and there are legends among the Indians that such creatures were known to their ancestors. Dr. Moreno is of the opinion, from evidences found in this cave and elsewhere, that these animals had been domesticated by man, but to what extent and for what purposes is unknown.

Consult Beddard, *Mammalia* (1902), where further references are cited.

GROUND-SNAKE, one of the little, burrowing worm-shaped snakes of the genus *Carphophiops*, which abound in tropical America. One species (*C. amœnus*) is numerous under stones and logs in the Southern States, and is glistening chestnut in color above and salmon-yellow beneath. A larger, more purplish species (*C. vermis*) is called 'ground-worm' in Louisiana. These snakes are perfectly harmless, and are the least specialized of the *Colubridæ*.

GROUND SQUIR'REL (*Tamias*): genus of rodent quadrupeds of the Squirrel family, differing from the true squirrels in the possession of cheek-pouches, in having a more slender body and shorter legs, and in other less important particulars; but most of all in their habits, residing chiefly on the ground, and seldom ascending trees to any considerable height. They are of small size, are all longitudinally striped on the back and sides, are extremely active and restless, and emit a peculiar 'chipping clucking sound, very widely differing from the quacking, chattering cry of the squirrels.' A well-known species is the HACKEE, or CHIPMUNK, or CHIPPING SQUIRREL (*T. Lysteri*) of N. America, of brownish-gray color, striped with black and yellowish white, the belly white. The fur is used for muffs, tippets, etc. Other species of ground squirrels are found in America, Asia, and Africa.

GROUP, n. *grôp* [F. *groupe*, a cluster—from It. *groppo*, a knot or lump of anything: Ger. *kropf*, a crop, a craw]: a small crowd or assemblage: an assemblage of figures or objects having some resemblance or character

in common: V. to bring or place together in a cluster or knot. GROUP'ING, imp.; N. the art of arranging or combining the objects in a picture, etc., in harmony with the design; in *drawing*, one or more groups form the picture. A bunch of grapes, or a pyramid, are examples of model-forms of groups adopted by different artists. GROUPED, pp. *grôpt*.—SYN. of 'group, n.': cluster; crowd; throng; assemblage; number.

GROUPS, in Mathematics: a group is a set of operations possessing the property that the combination of every pair of them is already contained among them. Thus the operations of adding 1, 2, 3, 4, . . . form a group. The rotations which convert a regular geometric solid (tetrahedron, octahedron, etc.) into itself form a group. The equations $x^1 = x$, $x^1 = ex$, $x^1 = e^2x$ $(e^3 = 1)$, when regarded as defining operations by which x^1 is obtained from x are another example of a group. Thus the second and third equations multiply x by e and e^2, their combination by e^3 giving the first equation. Another instance is furnished by the set of six operations

$$x^1 = x, \quad x^1 = 1 - x, \quad x^1 = 1/x, \quad x^1 = 1/(1-x), \quad x^1 = (x-1)/x, \quad x^1 = x/(x-1).$$

The theory of groups has entensive applications throughout mathematics, especially to the theory of equations. It is one of the most highly developed parts of the general calculus of operations. Its history begins with Galois (d. 1832).

GROUSE, n. *grŏws* [prob. from OF. *griesche*, speckled, gray: comp. Gael. *ceare-raoch*, the heather-cock—from *ceare*, a cock, *fhraoch*, the heather], (*Tetrao*): genus of gallinaceous birds, which, as defined by Linnæus, included partridges, quails, and all the birds now forming the family *Tetraonidæ*, and divided into many genera. The *Tetraonidæ* have a very short bill, rather thick, sharp, and a little curved, and generally a naked red patch over or behind the eye. They have three toes before, and generally one hind toe high on the tarsus, but the hind toe is often very short and sometimes lacking. Those to which the name grouse is popularly given have the legs feathered to the feet, but in the genus *Tetrao*, as now restricted by ornithologists, the toes are not feathered; in moorfowl and ptarmigan, they are completely so, and these have therefore been separated into a distinct genus, *Lagopus*. Partridges, quails, etc., which have not the tarsi feathered, are regarded as connecting the families *Tetraonidæ* and *Phasianidæ*, and are sometimes referred to the latter, though their intimate connection with the former is generally recognized. Some of the *Tetraonidæ* are polygamous, and this is the case with all, or almost all, the species of the genus *Tetrao*, while those of the *Lagopus*, nearly allied to them, pair.—The genus *Tetrao* contains the largest birds of the family, exceeded in this respect by almost no other gallinaceous birds. They have a full figure, with much mus-

GROUSE.

1. Prairie Hen (*Tympanuchus Americanus*).
2. Blackcock (*Tetrao wrogallus*).
3. Moor-hen or Ptarmigan (*Lagopus albus*) in winter dress.
4. Scotch Red Grouse (*Lagopus scoticus*).
5. Ruffled Grouse (*Bonasa umbellus*).
6. Hybrid between Blackcock and Capercailzie.

cular power, the tail is longer than in most of the family, is of broad feathers, and generally rounded. The females differ considerably in plumage from the males, which are often resplendent in black, brown, green, and blue. The species are natives of the n. and temperate parts of Europe, Asia, and America, the regions in which the *Tetraonidæ* in general are most abundant, though some of the family are found in warmer countries.—The largest species of *Tetrao* is the Capercailzie (q.v.), Good Grouse, or Cock of the Woods (*T. urogallus*); next to it, among European species, ranks the Blackcock (q.v.), (*T. tetrix*), the only other European species indeed, if the somewhat rare *T. hybridus* of continental Europe, the *Raeklehahn* of the Swedes (see BLACKCOCK), be regarded as the result of a mere accidental intermixture of these two.—The PINNATED GROUSE, or PRAIRIE HEN (*T. cupido*) of N. America, is rather smaller than the blackcock; the general color of the plumage is yellowish-red, with bars and crossings of black; the tail is very short and much rounded. The male has neck-tufts of narrow feathers, the largest of which are five inches long, and is still more remarkably adorned with two loose pendulous wrinkled skins, extending along the sides of the neck for two-thirds of its length, capable of inflation with air, and when inflated, resembling in bulk, color, and surface, middle-sized oranges. This species of grouse inhabits chiefly dry open districts, studded with trees or patches of brushwood. It was formerly common in N. J. and Penn., as well as on the western prairies, but has always become rare as a district has become cultivated and populous, notwithstanding laws for its preservation. It has almost disappeared from Kentucky, where it was at one time so abundant, that children were employed to prevent its depredations in the cultivated fields, and multitudes were shot and trapped merely to be thrown away. In the n.e. parts of the United States it exists, but is not abundant. It congregates in flocks in winter, which break up into smaller parties in the spring. The males have many combats at the approach of the breeding season. Their voice is described as a low *tooting* or *booming*. They strut, after the manner of turkey-cocks, with wings let down to the ground, and neck-feathers erected. Certain spots, known in the w. parts of America as their *scratching-places*, seem to be specially appropriated for their displays and combats, and there considerable numbers often meet about daybreak, dispersing after the sun is up. Many are shot on such occasions. The food of the Pinnated Grouse consists of seeds, berries, the buds of trees and bushes, insects, etc. It is highly prized for the table in those parts of America where it is rare. The flesh resembles that of the blackcock.—The SPOTTED GROUSE or CANADIAN GROUSE (*T. Canadensis*), is smaller than the Pinnated Grouse, about equal to the Scottish moorfowl. It inhabits the n. parts of America, and

is plentiful near Hudson's Bay. It is found chiefly in forests of pine or fir, feeding much in winter on the leaves and branchlets of these trees, as well as on their seeds, whence it is often called the Spruce Partridge. From this food the flesh acquires a strong and peculiar flavor in winter. The plumage of the upper parts is mostly brownish-black, transversely barred with brownish-gray; in some parts varying to a rusty orange. The tail is rounded.—The DUSKY GROUSE (*T. obscurus*) is a species almost as large as the capercailzie, native of the forests of the Rocky Mountains and the banks of the Columbia. The general color is blackish-brown, the wings lighter. The tail is large and rounded.—The MOORFOWL (q.v.), or RED GROUSE of Britain is allied to the ptarmigans rather than to these species, and is called Red Ptarmigan by some systematic writers, though it is the species to which, in popular language in Britain the name grouse is almost exclusively appropriated. For other species, often popularly called grouse, see BONASIA: COCK OF THE PLAINS: GANGA.

GROUT, n. *growt* [AS. *grut*, meal of wheat or barley: Icel. *grautr*, porridge: Dut. *grut;* Ger. *grütze*, groats]: coarse meal; a fine plaster for finishing ceilings; any solution of lime for cementing stones; an admixture of gravel and lime for cementing walls. GROUT'ING, n. finishing with grout.

GROUTS, n. plu. *growts* [Norw. *grut;* Dut. *gruyte*, dregs; Gael. *gruid*, grain, dregs: Dut. *gruis*, bran]: dregs; now usually called *grounds*, as of tea and coffee. GROUT-ALE, in *OE.*, poor ale from the grouts or grains of the first brewing. See GROUT.

GROVE, n. *grōv*, [AS. *graef*, a cave, a grove: Gael. *craobh*, a tree: OE. *greaves*, trees, boughs]: cluster of trees, a small piece of woods. GROVES, ancient places of idolatrous worship, being chosen as suitable, or planted for the purpose. Groves became so intimately associated with the idea of sacrifice and other religious rites, that the planting of a grove, sometimes even of a tree, became itself an act of religion, like the erection of an altar or the building of a temple. Thus 'Abraham planted a "grove" (Heb. a tamarisk tree) in Beer Sheba, and called there on the name of Jehovah, the Everlasting God' (Gen. xxi. 33). In all but one of the many other instances of the word 'grove' in the King James version of the Old Testament the translation is a mistake: the original is Asherah, meaning a tree-trunk or a post, a rude sort of idol, placed on a slight elevation and worshipped—said to have symbolized the generative powers; also called *Phallos* by the Greeks: compare Lat. *palus*, Eng. *pale* or *pole*.

GROVE, *grōv*, Sir GEORGE, D.C.L.: b. Clapham, England, 1820, Aug. 12; d. Sydenham, 1900, May 28. He was trained as a civil engineer, and erected some of the first cast-iron light-houses in the W. Indies. As a

member of the staff of Robert Stephenson, he was employed on railway works and the Britannia tubular bridge. He is known best for his services to music and to literature, as editor of *Macmillan's Magazine,* as a contributor to Smith's *Dictionary of the Bible,* but chiefly as editor (and part author) of the great *Dictionary of Music and Musicians.* He was a director of the new Royal College of Music.

GROVE, Sir WILLIAM ROBERT: English lawyer and physicist: b. Swansea, 1811, July 11; d. 1896, Aug. 2. He studied at Oxford and 1835 was called to the bar; 1871 he was raised to the bench, receiving knighthood 1872; and after the Judicature Act he became a judge in the high court of justice. He had highly distinguished himself in the subjects of electricity and optics, and was prof. of natural science at the London Institution 1840-47. In 1839 he invented the powerful voltaic battery known by his name. He contributed extensively to scientific journals, and published several very important lectures, as those on the Progress of Physical Science (1842), the Correlation of the Physical Forces (1846), the Continuity of Natural Phenomena (1886). He was pres. of the British Assoc. 1842, received numerous distinctions, and was a fellow of various learned societies at home and abroad.

GROVEL, v. *grŏv'l* [It. *grufolare,* or *grofolare,* to grub up with the snout like the hog: Icel. *grufla,* to feel with the hands, to grovel on the ground]: to creep on the ground; to be low or mean. GROVELLING, or GROVELING, imp. *grŏv'ĕl-lĭng:* ADJ. mean in life or character; without dignity. GROV'ELLED, or GROVELED, pp. *-ĕld.* GROVELLER, or GROV'ELER, n. *-lẽr,* one who.

GROVER, *grō'vẽr,* CUVIER: 1829, July 24—1885, June 6; b. Bethel, Me.: soldier. He graduated at the U. S. Milit. Acad. 1850, entered the army as brev. 2d lieut. of artill., promoted 2d lieut. 1850, Sep.; 1st lieut. of inf. 1855, Mar.; capt. 1858, Sep.; maj. 1863, Aug.; lieut.col. 1866, July; brev. lieut.col., col., brig.gen., and maj.gen. U. S. A., and appointed col. 1st U. S. cav. 1875. In the civil war he served in the army of the Potomac and in the Dept. of the Gulf, commanded a div. and a corps, and attained the rank of brev. maj.gen. of volunteers.

GROW, v. *grō* [AS. *growan,* to grow: Icel. *groa;* Dut. *groeyen,* to grow, to flourish]: to increase in size or stature by a natural process; to increase or become greater; to be changing from one state to another; to vegetate; to cause to vegetate; to improve; to raise or produce, as corn; to proceed, as from a cause or reason. GROW'ING, imp. ADJ. advancing in size or extent; increasing; thriving; producing. GREW, pt. *grô,* did grow. GROWN, pp. *grōn:* ADJ. increased in growth; arrived at full growth or stature. GROW'ER, n. one who raises or produces. GROWTH, n. *grōth,* the act of growing;

increase; advancement. GROWN OVER, covered with a growth, as of creeping plants. To GROW OUT OF, to issue from, as a branch from a tree; to result from To GROW UP, to arrive at full stature or maturity. GROW TOGETHER, to become united by growth.—SYN. of 'grow': to become; augment; enlarge; develop; issue; turn; proceed; accrue; adhere; swell; advance; raise.

GROW, GALUSHA AARON, American statesman: b. Ashford (now Eastford), Windham County, Conn., 1823, Aug. 31; d. Glenwood, Pa., 1907, March 31. He was graduated from Amherst College in 1844, was admitted to the bar of Susquehanna County, Pa., in 1847, was elected to Congress in 1850, and was six times re-elected, once unanimously, from the same district. During his first three terms he was a Free-Soil Democrat, during the last three a Republican. He was chairman of the committee on the Territories in the Thirty-fourth and Thirty-sixth Congresses, and speaker of the Thirty-seventh Congress, whose five-weeks' session of 1861, July 4—Aug. 6, largely defined the government attitude toward the Confederacy and voted $500,000,000 for war purposes. He introduced the Homestead bill into the House, fought for it 10 years, finally obtained its enactment, and signed it as speaker. In 1879 he declined the mission to Russia, in 1894 was elected from Pennsylvania as congressman-at-large, and was successively re-elected to the Fifty-fourth, Fifty-fifth, Fifty-sixth and Fifty-seventh Congresses. His plurality in 1896 was 297,446. He was also a delegate to the national Republican conventions of 1864, 1884, and 1892, and chairman of the Pennsylvania State Republican committee in 1868. In 1871–6 he was president of the International and Great Northern railway company of Texas. His long record of conspicuous service is almost unparalleled in the political annals of the United States.

GROWL, n. *growl* [Dut. *grollen*, to cry as a cat: Norw. *gryla*, to grunt: F. *grouiller*, to rumble: prov. F. *grouler*, to grumble: Ger. *groll*, spite, rancor]: a deep angry snarl, as of a dog; an angry murmur: V. to snarl or grumble as an angry dog. GROWL'ING, imp. GROWLED, pp. *growld*. GROWL'ER, n. a grumbler; a snarler. *Slang*, a pitcher or can used to carry beer, ale or other beverage. GROWL'INGLY, ad. *-lĭ*.

GROWLER [named from a sound which it emits]. (*Grystes salmoides*): fish of the Perch family, abundant in many rivers of the United States, e.g., in the neighborhood of New York. It attains a length of two ft. It is of olive color, dark on the upper parts and grayish-white beneath. The growler is much esteemed for the table, and affords good sport to anglers. It receives its name from a sound which it emits. The genus Grystes has small scales and only fine card-like teeth. Another species is found in the Macquarie river, in New Holland.

GROWSE, v. *grôz* [Ger. *grausen*, to shudder at: Bav. *gruseln*, to shudder]: in *Scot.*, to chill before the ague-fit; to shiver; to have chills. GROWS'ING, imp.: N. a shivering. GROWSED, pp. *grôzd:* see GRUE, which is a spelling of the same word.

GROWTH. See under GROW.

GROYNES, n. plu. *grŏynz:* another spelling of GROINS, which see under GROIN.

GRUB, n. *grŭb* [Dut. *grubbe*, a pit, a ditch: Low. Ger. *grubbeln*, to root about with the hand: Ger. *grübeln*, to pick, to stir]: larva of coleopterous insects (see COLEOPTERA); a short worm that digs in the earth; a maggot. Different species are destructive to different kinds of plants: for the most important see the respective titles; see also the titles of the important cultivated plants, for the grubs most hurtful to them. In *familiar slang*, food or victuals: V. to dig up with the hands or with a small instrument, as roots; to root out of the ground by digging; to work underground, as a grub; to work among, as by digging, generally for an object difficult to be reached. GRUB'BING, imp.: N. the act of digging up by the roots. GRUBBED, pp. *grŭbd.*

GRUB, in Cattle and Sheep: a small worm hatched from the egg of the gad-fly. Cattle are attacked by the fly from June to Sep. The skin of the back is punctured and an egg deposited in each opening. The larvæ work their way under the skin and cause painful swellings. The wounds do not heal. In the spring the grubs, grown to considerable size, work their way through the apertures and bury themselves in the ground, where they undergo a transformation, and whence they appear as flies. The grub may be removed by pressure around the opening. The orifice should first be slightly enlarged by a sharp pen-knife. Sheep are attacked by the fly during the summer months. The eggs (some insist that the 'living young') are deposited in the nostrils of the sheep. The larvæ work their way upward to the maxillary sinuses, and attach themselves to the mucous membrane, where they remain until the next spring, when they fall to the ground, and in a few weeks are transformed. If attended to early they may be removed by the use of a feather dipped in oil of turpentine. Blowing tobacco smoke up the nostrils, and injections of dilute carbolic acid are also recommended. Smearing the noses of the sheep with tar is an excellent preventive.

GRUBBER: the English name for an agricultural implement drawn by one or two horses and used for pulverizing the soil. In this country heavy harrows and cultivators made especially for working rocky soils, or land recently cleared of trees and in which stumps and roots remain, are sometimes called grubbers. Unlike the plow the grubber is not designed to turn the soil, but it is expected to do more thorough work in loosening it than can be performed with the ordinary harrow.

It is made in various forms. When teeth are used it resembles the scarifier, and works to but little depth. When tines or coulters are used, the soil is more deeply stirred. It is frequently made with a small wheel at each end, by means of which the depth of working can be easily regulated. The operator guides its course by handles similar to those of a cultivator. In England the grubber is largely used in working fallow fields and in the cultivation of root crops. In the United States a large and heavy hoe is sometimes called a grubber, properly a grub-hoe. The same term is also used to designate a thick ax used in cutting roots and removing stumps.

GRUDGE, n. *grŭj* [OF. *grugcr*, to grieve, to mutter: Icel. *krutr*, a murmur: Gael. *gruig*, morose, inhospitable: Gr. *grudsein*, to grumble, to mutter]: secret enmity; ill-will; an old cause of quarrel; discontent: V. to give or take unwillingly; to be disagreeably parsimonious; to be discontented at another's enjoyments or advantages. GRUDG'ING, imp.: N. discontent at another's possessing, etc. GRUDGED, pp. *grŭjd*. GRUDG'ER, n. *-ẽr*, one who. GRUDG'INGLY, ad. *-lĭ*, with reluctance or discontent. —SYN. of 'grudge, n.': spite; pique; dislike; aversion; hatred; envy; quarrel; malice.

GRUE, or GROUE, v. *grô* [Scot.: Ger. *grauen*, to dread, to fear; *grausam*, frightful, horrible: Dan. *grue*, to fear: Gael. *gruth*, a fierce look; *gruamach*, sullen, gloomy]: in *Scot.*, to have a chilly sensation passing over the body; to be aguish; to shudder; to shiver; to be filled with terror. GRU'ING, imp. GRUED, pp. *grôd*. GRUESOME, a. *grô'sŭm*, having a chilly sensation; aguish, frightful; fearful; loathsome.

GRUEL, n. *grô'ĕl*, [F. *gruau*, oatmeal—from mid. L. *grŭtel'lum*—from *grŭtum*, meal: W. *grual*, gruel: Norw. *graut*, porridge: prov. F. *gruda*, husked oats or grain more or less broken]: a thin mixture, made by boiling oatmeal or its flour, in water.

GRUFF, a. *grŭf* [Dut. *grof;* Dan. *grov*, coarse, big: Gris. *grufflar*, to snore]: rough or stern in manners or voice; harsh or surly. GRUFF'LY, ad. *-lĭ*. GRUFFNESS, n. roughness of manner or voice.

GRUGINGS, n. plu. *grŭj'ĭngz* [Norm. F. *grugeons*]: the same as GURGEONS, which see.

GRUGRU, *grô'grô:* grub or larva of *Calandra palmarum* (called also *Rhyncophorus palmarum*, and *Cordylia palmarum*); insect of the weevil family (*Rhyncophoræ*) inhabiting Guiana and other tropical parts of America. The perfect insect is an inch and a half long. The grub is an ugly inactive creature of whitish cream color, as long and as thick as a man's thumb, and lives in the soft and spongy central part of the Cabbage Palm (*Euterpe oleracea*), on which it feeds. It is extremely fat and oily, and is esteemed a great delicacy,

not only by the Indians, but by many of the European colonists and their descendants, particularly the Dutch. It is cooked by roasting, and eaten with bread and butter, after being sprinkled with cayenne pepper. The fragrance of roasted grugru is said to be most tempting to epicures. A cabbage palm which has been cut down often becomes in a short time almost filled with grugrus; but they are obtained usually from the upper part of the stem of growing palms near the crown. A negro is often sent up with a cutlass, to cut them out of the wood.

GRUM, a. *grŭm* [Dan. *grum*, atrocious: AS. *grom*, fierce: Gael. *gruaim*, a surly look: W. *grwm*, a growl]: sour, surly. GRUM'LY, ad. *-lĭ*, in a surly manner: ADJ. surly; morose. GRUMBLE, v. *grŭm'bl* [Dut. *grommelen;* F. *grommeler*, to murmur]: to express discontent in a low murmuring voice; to growl; to make a hoarse rumbling noise. GRUM'BLING, imp.: N. a murmuring through discontent. GRUMBLED, pp. *grŭm'bld*. GRUM'BLER, n. *-blẽr*, one who grumbles; a discontented man. GRUM'BLINGLY, ad. *-lĭ*.

GRUME, n. *grôm* [OF. *grume*, a knot, a cluster: L. *grūmŭs*, a little heap or hillock: It. *grumo*, a clot of blood]: a fluid thickened; a clot, as of blood. GRUMOSE, *grô-mōs'*, or GRUMOUS, a. *grô'mŭs*, thick; clotted; knotted; in *bot.*, in clustered grains—applied to fleshy tubercular roots. GRU'MOUSNESS, n.

GRUMPY, n. *grŭm'pĭ* [Dan. *grum*, ferocious: W. *grwm*, a murmur, a growl (see GRUM)]: querulous, complaining; brooding and melancholy, over real or fancied injuries. GRUMPH, v. *grŭmf*, in *prov. Eng.*, to grumble; to growl. GRUMPH'ING, imp. GRUMPHED, pp. *grŭmft*.

GRÛN, ANASTASIUS (pseudonym for AUERSPERG ANTON ALEXANDER, Count VON): 1806, Apr. 11—1876; b. Laibach, cap. of the Austrian duchy of Carniola. He was educated at Gratz and at Vienna, studying jurisprudence. In 1848 and 60, he was active in politics, as an intrepid and powerful upholder of political and religious liberalism—latterly in the Austrian house of lords. He had great fame as a poet: publishing among other poems, the following: *The Last Knight* (1830), *Walks of a Vienna Poet* (1831), *Ruins* (1835). His fiction was often majestic, and his conceptions were striking and original. His most popular short poem is *The Last Poet.*

GRUNBERG, *grûn'bĕrĉh*, or GRUNEBERG: town of Prussia, province of Silesia, prettily situated near the n. boundary of the province, on the Golden Lunse, 59 m. n.n.w. of Liegnitz. It consists of the town proper surrounded by a wall pierced by three gates, and of four important suburbs, and is seated amid vine-clad mountains. Grunberg is known chiefly for the fine sparkling wine extensively produced in the vicinity. The 700th year of its trade in this excellent commodity was cele-

brated 1850, Oct. Grunberg has also an active trade in the manufacture of woolen cloths and tobacco, and in the growing of fruit. Pop. 21,200.

GRUNDTVIG, *grûnt'vĭg*, NIKOLAI FREDERIK SEVERIN: 1783, Sep. 8—1872, Sep. 2; b. Udby, island of Seeland: poet and theologian. He was educated in the free school of Aarhuus, Jutland, and the Univ. of Copenhagen; spent several years studying theol., Icelandic literature, languages and Shakespeare, Schiller, and Fichte; published *Northern Mythology* 1808, *Decline of the Heroic Life in the North* 1809, and a number of poetical works and paraphrases 1812–22, meanwhile preaching to a large congregation in Copenhagen; published *The Church's Reply*—for which he was prosecuted, fined, and forbidden to preach for seven years—1825 and *Songs for the Danish Church* 1837; resumed preaching 1839; was prominent in politics from 1844 till after the first German war; and received the titular rank of bp., but without a see, 1861.

GRUNDY, *grŭn'dĭ*, in the phrase MRS. GRUNDY: in Tom Morton's 'Speed the Plough' occur the expressions, 'What will Mrs. Grundy say?' 'What will Mrs. Grundy think?'; a general name for outside fault-finders and busy bodies; the world in general.

GRUNT, n. *grŭnt* [F. *grogner*, to grunt—from L. *grunnīrĕ*, to grunt: Ger. *grunzen*, to grunt, to mutter]: a short rough sound, as uttered by a hog or sow: V. to utter a short rough sound, as a hog; to snarl. GRUNT'ING, imp.: ADJ. uttering grunts: N. the sounds uttered by a hog; the act of one who grunts. GRUNT'ED, pp. GRUNT'INGLY, ad. *-lĭ*.

GRUS, n. *grŭs* [L. a crane]: in *astron.*, the *Crane*, a constellation introduced by Bayer, and now arranged as one of Lacaille's 27 southern constellations: it is between Eridanus and Sagittarius.

GRUYERE, or GRUYERES, *grü-yär':* small decayed town of Switzerland, canton of Freiburg, 16 m. s.s.w. of the town of Freiburg, about a m. from the left bank of the Saane or Sarine. The town is known chiefly from its giving name to the famous Gruyères cheese, which is made in great quantities in the surrounding district. It owes its flavor chiefly to *Melilotus officinalis*. Pop. about 1,200.

GRYLLUS, *grĭl'ŭs:* Linnæan genus of insects of the ord. *Orthoptera*, answering to the section *Saltatoria* (Lat. leapers) of later entomologists, and containing crickets, grasshoppers, locusts, etc. The genus has been subdivided into many genera, which have been grouped into families; but great confusion exists in the nomenclature, the crickets and their allies being the genus *Gryllus*, and family *Gryllidæ* of some authors, *Acheta* and *Achetidæ* of others; grasshoppers being *Gryllus* and *Gryllidæ* of some, *Locusta* and *Locustidæ* of others; and locusts,

in like manner, being *Locusta* and *Locustidæ*, or *Acrydium* and *Acrydidæ:* see CRICKET: GRASSHOPPER: LOCUST. The three groups are very closely allied. They all are characterized by the large thighs of the last pair of legs, and great power of leaping. The stridulous sounds which they emit are produced in some—crickets and grasshoppers—by rubbing together the bases of the elytræ; in others—locusts—by rubbing the thighs against the elytræ. The females lay their eggs usually in the ground.

GRYPHÆA, n. *grĭ-fē'ă*, or GRYPHITE, n. *grĭ'fīt* [L. *gryps;* Ger. *grups*, a griffin]: in *geol.*, a sub-genus of the oyster family, abounding in the lias, oolite, and chalk formations.

GRYPHIUS, *grē'fē-ûs*, SEBASTIAN: 1493–1556; b. Reutlingen, in Swabia: printer. He came as a youth to Lyon, and died there; having (1528–47 issued more than 300 works, notable for accuracy and clear type. Gryphius preferred a large bold Italic type. Among the more noted works are the fine Latin Bible of 1550, and Dolet's *Commentaria Linguæ Latinæ* (1536). The original German spelling of the Latinized name Gryphius is *Gryph*, the French *Grypho*. The well-known emblem on Gryphius' publication is a griffin. Gryphius' sons, Antoine and François also were famous French printers.

GRYPHON, n. *grĭf'ŏn* [Gr. *grups*, a griffin]: another spelling of GRIFFIN, which see.

GRYPINÆ, n. *grĭp'ĭ-nē* [mod. L. *grypus, gryphus*]: in *ornith.*, wedge-tailed humming-birds, sub-family *Trochilidæ*, of which *Grypus* is the type: see HUMMING-BIRDS.

GRYS-BOC, *grĭs'bŏk* (*Antilope melanotis* or *Calotragus melanotis*): animal of the antelope family, native of s. Africa, and common in most parts of Cape Colony. It is about three ft. in length, and about a foot and a half in height at the shoulder. The grys-boe lives in pairs on the plains. It is not very swift, is easily captured, and its flesh is much esteemed.

GUACHARO, *gwâ-châ'rō* (*Steatornis Caripensis*): remarkable S. American bird, of the ord. *Insessores*, tribe *Fissirostres*, generally referred to the family *Caprimulgidæ*, but widely differing from the goatsuckers and most of that family, and indeed from the *Insessores* generally, in having a strong bill and being frugivorous. The food of the guacharo consists of hard and dry fruits. It is about the size of a common fowl; the plumage brownish gray with small black streaks and dots. The guacharo is a nocturnal bird, singular among frugivorous birds. It spends the day in deep and dark caverns, where great numbers congregate and make their nests. Humboldt gives an interesting account, in his Personal Narrative, of a visit to the great Guacharo cavern in the valley of Caripe, near Cumana. This cavern is visited

once a year for the sake of the fat of the young birds, which soon after being hatched become almost a mass of fat, and which are slaughtered in great numbers, and their fat melted and stored for use as butter or oil. The clarified fat is half liquid, transparent, inodorous, and will keep for a year without becoming rancid.

GUACHOS (better *Gauchos*): horsemen of the great plains of S. America, especially of the Argentine Republic. They live in rude huts with scanty furniture, and are employed chiefly in breeding and breaking-in horses, in herding, catching, and slaughtering cattle. They and their women are usually tall and handsome, and are mainly of pure Spanish blood, having mixed little with the Indians. The Guachos are most expert horsemen, and use the lasso (q.v.) and bolas with marvellous skill. They are hospitable, but violent and vindictive, and are much given to drink and gambling. They have been prominent in S. American political history, but as a distinct class are decreasing in numbers.

GUADALAJARA, *gwâ-thâ-lâ-ċhâ'râ:* province of Spain, most n. eastern of the five modern provinces into which New Castile has been divided. 4.869 sq. m. The soil is generally good. Iron abounds, and has been worked from early ages. Pop. (1900) 200,186. See CASTILE.

GUADALAJARA, or (older spelling) GUADALAXARA, *gwâ-thâ-lâ-ċhâ'râ:* capital of the state of Jalisco or Xalisco, Mexico; on the Rio Grande de Santiago, abt. 280 m. w.n.w. of the city of Mexico. As the houses are generally but two stories high, the place covers much territory. It contains the govt. buildings, a cathedral, a mint, an episcopal palace, an opera, large barracks, a college, and many inferior seminaries. It has well-supplied markets, and extensive manufactures of cotton and earthenware; confectionery and excellent silk embroidery also are made. Pop. (1900) 101,208.

GUADALAVIAR, *gwâ-thâ-lâ-vē-âr'*, or TURIA, *tū'rĭ-a:* river of Spain, rising near the source of the Tagus, in the s.w. of Aragon, and after a course of 130 m., generally s.s.e., falls into the Mediterranean, at Grao, a mile and a half e. of Valencia. The Guadalaviar, in passing through the beautiful gardens of Valencia, is divided, for irrigation, into eight canals. Its mouth is much silted up.

GUADALQUIVIR, *gwâ-thâl-kē-vēr'* (Arab. *Wad-al-Kebir*, the great river; anc. *Bætis*): most important river of Spain, for mass of waters, and for extent of its natural navigation. It rises in the Sierra de Cazorla, near the e. border of the province of Jaen; flows generally s.w. through the provinces of Jaen, Cordova, Sevilla; and forming the boundary for about ten m. between the provinces of Huelva and Cadiz, falls into the Atlantic at San Lucar de Barrameda, after a course of about

360 m. The principal towns upon its banks are Montoro, Cordova, and Sevilla, to the last of which, about 80 m. above its mouth, the river is navigable. Below Sevilla it twice divides itself into two branches, forming two islands—Isla Menor and Isla Mayor. Its chief affluents are the Gadajos and the Jenil on the left, and the Guadalimar and the Guadiato on the right. The lower course of the Guadalquivir is sluggish and dreary in the highest degree; the stream turbid and muddy, eats its way through an alluvial level given up to herds of cattle and aquatic fowls. There are no villages in this district, which, though favorable to animal and vegetable life, is fatal to man, from the ague and fever caused by the numerous swamps. There is no great trade on the Guadalquivir; foreign vessels are generally moored at the Isla Menor, and their cargoes sent up to Sevilla on barges.

GUADALUPE, *gaw-da-lôp'*, Sp. *gwâ-thâ-lô'pā:* river rising in s. Texas, flowing s.e. and emptying into Espiritu Santo Bay, after a course estimated at about 250 m. The geography of this stream and its capabilities are not yet well-known.

GUADALUPE Mountains, *gaw-da-lôp':* in New Mex. and Tex. between the Rio Grande and the Pecos rivers. They are a side-chain from the Rocky Mountains, with which they unite on the north.

GUADALUPE-HIDALGO, *gwâ-dâ-lô'pā-ē-dâl'gō,* a village of the federal district of the United States of Mexico, at the foot of the Guadalupe Mountains, three miles north of the city of Mexico. The treaty of peace between the United States and Mexico was signed here 1848, Feb. 2. The village contains the famous picture, *Our Lady of Guadalupe,* which tradition says was received in a miraculous manner by an Indian, Juan Diego, in 1531. It was long held in high repute by the people in and about Mexico; but it was not until 1757 that Pope Benedict XIV. gave sanction to the devotion.

GUADALUPE-HIDALGO, Treaty of, 1848, Feb. 2: the treaty which closed the Mexican War. The place is a suburb of the city of Mexico. While the war was in progress, Polk sent Nicholas P. Trist of Virginia, then chief clerk of the State Department, to negotiate a treaty of peace; the conditions to include the cession of Upper and Lower California and New Mexico (conquered by Kearney, Stockton and Frémont, and a chief object for provoking the war), and the Rio Grande for boundary between Mexico and the United States. Trist went to Scott's headquarters, an armistice was arranged, and in 1847, August, the three Mexican commissioners and Trist met and exchanged proposals. The former would not yield to such terms, demanded the Nueces as the boundary (giving them Corpus Christi and a large triangle of the south), and offered much less other territory. Trist was recalled, but remained at headquar-

ters; Santa Anna declared that he was tricked in the proposals, war operations went on, and the city of Mexico was captured not long after. In 1847, January, negotiations were resumed, Trist still acting as principal, and the treaty above was agreed on. The Senate, however, refused to accept it, and insisted on harsher terms; Mexico was forced to accept them, and the Senate ratified the treaty March 10. Formal proclamation was made 1848, July 4. The land cession was of Upper California and New Mexico, and the Rio Grande was made the boundary. The United States paid Mexico $15,000,000, and assumed $3,250,000 of claims made by United States citizens against Mexico prior to the treaty, besides any claims to which under the conventions of 1839 and 1843 Mexico was adjudged liable. Of the 252 claims put in under this treaty, 182 were finally allowed.

GUADELOUPE, *gâ-da-lôp'* [Fr. *gwâd-lôp'*), West Indies, an island of the inner chain of the Caribbees. (See ANTILLES.) It lies in lat. 15° n. and long. 61° w. and, with its dependencies, has an area of 583 to 600 square miles. A strait divides it into two parts, called Basse-Terre and Grande-Terre. The former is mountainous, its highest peaks being La Soufrière (4,900 feet), Deux Mamelles (2,540 feet), Grosse Montagne (2,370 feet), and Caraibe (2,300 feet); and its volcanic character has been manifested most impressively by the eruption of La Soufrière in 1797 and the disastrous earthquake in 1843. The eastern division, or Grande-Terre, on the contrary, is a calcareous plain, which at no point attains an elevation of more than 450 feet. The mean temperature of Guadeloupe is 78° F., the maximum being 101° and the minimum 61°. The dependencies referred to above are the adjacent islands, Maria Galante, Les Saintes, and Désirade. The chief products are sugar, coffee of the finest quality, and cocoa. Revenues amount to about $1,300,000 to $1,400,000 annually; expenditures, including the appropriations made by France from time to time, are somewhat in excess of that sum. Guadeloupe is a department of France, represented in the French chambers by one senator and two deputies. Its local interests are directed by a governor and a general legislative assembly of 30 members, the jurisdiction embracing one-half of St. Martin, besides the islands which have been mentioned. There are nearly 100 elementary schools, with 11,000 pupils, and one *lycée*, with 350 pupils. The chief seaport, Point-à-Pitre, with about 17,000 inhabitants, is situated on the eastern side of Basse-Terre. Several times its buildings have been destroyed or severely damaged; in 1903 minor earthquakes were reported to be of frequent occurrence; and a fresh outbreak from La Soufrière was thought to be not improbable. Le Moule, the principal town of Grande-Terre, resembles Point-à-Pitre in size and situation. After the discovery, Guadeloupe belonged to Spain until 1635; in that year it was

taken by the French; in 1794 England seized it, freed the slaves, and retained possession until 1802; then it passed again into French hands, together with Martinique, England taking St. Lucia in exchange; the restoration of slavery by the French was resisted by the negroes, and was attended with great suffering and loss of life; for a brief period in 1810 England once more held Guadeloupe, but returned it to France; emancipation was declared in 1848. The inhabitants are largely French mulattoes, with perhaps 15,000 coolies. Total population, including dependencies, about 167,000. Consult Hill, *Cuba and Porto Rico, with the other Islands of the West Indies.*

GUADIANA, *gwâ-dē-â'nâ*, Sp. *gwâ-thī-â'nâ* (anc. *Anas*); one of the longest though narrowest and poorest in volume of the five great Spanish rivers. It rises on the w. boundary of Murcia, about 8 m. n.w. of the town of Alcaraz; flows n.w. about 30 m., then disappears among swamps; flows underground in a westward direction nearly 30 m.; and appears again at Daymiel, after throwing up in its subterraneous course numerous lakes called *Los ojos* (the eyes) *de la Guadiana.* From Daymiel it flows w. through La Mancha and the province of Estremadura, until, passing the town of Badajoz, it bends s., forming for about 35 m. the boundary between Spain and Portugal. Near the town of Monsaras it enters the Portuguese territory, and passes through the e. district of the province of Alemtejo. Finally, turning e., and again forming the international boundary for about 30 m., it enters the Atlantic below the town of Ayamonte. It is about 520 m. in length, navigable only about 35 m. Its chief affluents are the Giguela on the right, and the Javalon and Ardila on the left.

GUAIACUM, n. *gwā'yă-kŭm* [Latinized from Sp. *guayaco*]: genus of large evergreen trees of the nat. ord. *Zygophyllaceæ*, natives of the tropical parts of America, having abruptly pinnate leaves and axillary flowers on one-flowered stalks, often in small clusters. The flowers have a 5-partite calyx, five petals, ten stamens, and a tapering style, the fruit is a capsule, 5-angled and 5-celled, or the cells by absorption fewer, one seed in a cell. The trees of this genus are remarkable for the hardness and heaviness of their wood, generally known as *Lignum Vitæ*, but sometimes as *G. Wood*, sometimes as *Brazil Wood;* as well as for their peculiar resinous product, *Guaiacum* (shortened into Guiac, *gwī'ăk*), often incorrectly called *Gum Guaiacum.* The species to which the commercial lignum vitæ and Guaiacum are commonly referred, is *G. officinale*, native of some W. India islands, and of some continental parts of America; a tree sometimes 30 or 40 ft. high, with two or three pairs of ovate, obtuse, and perfectly smooth leaflets, pale-blue flowers, a furrowed bark, and generally a crooked stem and knotty branches. It is probable, however, that other

species, as well as this, supply part of the Guaiacum wood and resin of commerce. At present, these are obtained chiefly from Cuba, Jamaica, and St. Domingo. The wood is imported in billets about three ft. long, and 12 in. in diameter, of greenish-brown color. This is the color of the heartwood, the sap-wood is pale yellow. Guaiacum wood is remarkable for the direction of its fibres, each layer of which crosses the preceding diagonally; annual rings are scarcely observed, and the pith is extremely small. It sinks in water. It is much valued, and used for many purposes, chiefly by turners; ships' blocks, rulers, pestles, and bowls (see BOWLS) are among the articles commonly made of it. When rubbed or heated, it emits a faint disagreeable aromatic smell; its taste is also pungent and aromatic. Shavings and raspings of the wood are bought by apothecaries for medicinal use. The bark also is used in medicine on the continent of Europe, though not in Britain. The virtues of both wood and bark depend chiefly on the resin which they contain, which is used in powder, pill, and tincture. It is an acrid stimulant, beneficial in chronic rheumatism, in chronic skin diseases, in certain cases of scanty and painful menstruation (hence occasionally a remedy in cases of sterility), and in chronic catarrh. It has been highly praised also as a preventive of gout. In the 16th and 17th c., Guaiacum was the remedy most in repute for syphilis. The resin sometimes flows spontaneously from the stem of the trees; it is sometimes obtained artificially. It is of greenish-brown color, and has a brilliant resinous fracture. It has scarcely any taste, but leaves a burning sensation in the mouth. One of the most striking characteristics is, that it is colored blue by its oxidizing agents. It contains *guaiacic acid* ($C_{12}H_{16}O_6$), which closely resembles benzoic acids, and yields, on distillation, certain definite compounds known as *guaiacine*, *pyroguaiacine*, and *hydride of guaiacyl.*—*Guiacol*, *gwā'yă-kŏl* [Lat. *oleum*, oil], is a colorless aromatic ether obtainable from the resin.

GUAICURÚS, *gwī-kô-rôs':* large tribe of Indians living in the valley of the Paraguay river, in Brazil, having a harmonious but guttural language, copper-colored skin, and long straight hair. They have three castes, nobles, warriors, and slaves. A few of their number were converted to Christianity by missionaries many years ago, but the great majority remained and still are pagans.

GUALEGUAYCHÚ, *gwâ-lā-gwī-chô':* city in the province of Entre Rios, Argentine Republic, S. America, on the river of the same name. It is in a fine grazing region, has large cattle and sheep interests, and exports large quantities of beef, mutton, hides, wool, tallow, horns, bone manure, and other animal products. The city is well built, has wide and regular streets, is very cleanly, and has numerous factories for its various animal industries. Pop. (1900) about 15,000.

GUAM, *gwâm* or *gô-âm'* or GUAJAN, *gwâ-hân'*, one of the Ladrone Islands, the southernmost and largest, and the only one with much population; east of the Philippines; occupied by the United States in 1898, the remainder of the group belonging to Germany. It is 29 miles long by 3 to 10 wide, and about 150 square miles in area; high and precipitous on the eastern side, and forming a low plateau in the northern part, but mountainous in the south. About half the soil is arable, but only about one per cent cultivated. Except for the native clearings, most of it is thick and pathless jungle. Some of the trees are valuable hardwoods for ship-building or ornamental cabinet-work; others are useful for food, as the cocoanut (the finest here of all the tropics), pineapple, breadfruit, sour-sop and custard-apple, etc.; the hau (*Hibiscus tiliaceum*) makes strong cordage, not affected by water; the pandanus' long leaves are braided into mats and hats; and the ylang-ylang is famous for perfume. Rice, sugar, tobacco, hemp, coffee, cacao, bananas, melons, etc., have been introduced and are cultivated. The only native mammals are rats, flying foxes, and bats; but the deer and wild goat, of European origin, have thriven plentifully, and cows and pigs are raised. There are no snakes; there are centipedes and scorpions, but none dangerous. The climate is very rainy, but mild except in midsummer, when the conflict of trade-winds produces a dead calm, oppressive heat, and storms, with some hurricanes. Earthquakes are frequent. The island is volcanic, with bordering coral reefs. The east side has but two good harbors, Pago and Tarofofo; the latter is the only one, except San Luis d'Apra on the west, which is safe for vessels all the year round. The island contains about 9,000 people; Chamorros with a mixture of Tagal and Malay, and some Anglo-Saxons from whaling ships, producing half-breeds with copper skins and light hair. They are nearly all in the villages; those with ranches build rough huts on them, where the family spend part of the time. Agaña (San Ignacio d'Agaña) is the only large town; it is a neat place with houses half of stone and half of wood or bamboo, and contains 6,400 people. Its best port is Apra (above), on a deep bay formed by a peninsula; its own harbor being dangerous in a storm from the anchors dragging on the coral bottom, and the landing bad from breaking reefs. There is a mission school, endowed in the 17th century by Maria Ana, queen of Philip IV. of Spain. Umata, on the west, was the former capital. Agat, 400 people, is next in importance to Agaña; but the next largest in size are Suwai, 900, and Ynarajan, a fair port on the southeast, 550. Merigo has 300. (Wheeler, *Report on Guam*, 1900, War Dept. doc. 123.)

GUAN, n. *gū-ăn'* or YACOU (*Penelope*): genus of large, gallinaceous birds of the family *Cracidæ*. They have a

naked skin on the throat capable of being inflated or swollen, and a naked space around each eye. The name Guan belongs particularly to *Penelope cristata*, a species of which the entire length is about 30 inches, native of the forests of Brazil and Guiana long domesticated in S. America. It was found at the end of last century that the Guan could endure the climate of Britain and of Holland, and hopes were entertained of its becoming domesticated in the poultry yards of Europe and America; but success in any instance has not been recorded. Its flesh is much esteemed for food.

GUANABACO'A. See HAVANA.

GUANACO, n. *gwă-nâ'kō* [Sp.—from Peruvian, *huanacu*], (*Auchenia huanaca*): ruminant animal common in S. America and most abundant in Patagonia, Peru, and Chili, believed by some authorities to constitute a distinct species, and by others to belong to the camel family, to be a wild variety of the llama, and to be allied to the alpaca (see AUCHENIA: ALPACA). They are vigilant and shy, live in flocks on the mountains, descend to the plains in search of food, are readily tamed, about 3 ft. high at the shoulders, of a reddish brown color, and with fine soft wool 4–6 inches long. The Guanaco is very swift in motion, ejects offensive saliva when attacked or displeased, has a peculiar cry somewhat resembling the neighing of a horse, and its flesh furnishes food and its skin clothing to the Patagonian Indians. It has great curiosity, by exciting which hunters draw it within reach of their rifles.

GUANAHANI, *gwâ-nâ-hâ'nē*, or CAT ISLAND: one of the Bahamas, generally regarded as Columbus's first discovery in the new world, being presumed to be identical with the San Salvador of the illustrious navigator. Recent criticism, however, appears to have transferred this honor to Watling Island (q.v.), about 50 m. e.s.e.

GUANAJUATO, *gwâ-nâ-hô-âtō*, Mexico, a state bounded by the states of San Luis Potosi, Queretaro, Michoacân, and Jalisco. Area 20,276 square kilometres, or 7,806.26 square miles. The principal cordilleras traversing the state are the Sierra Gorda, in the northeast, and the Sierra de Guanajuato in the centre, which are formed by the junction of the Codorniches, San Antonio, and Santa Rosa mountain ranges. The highest peaks are the Gigante (2,346 metres) and the Llanitos (2,815 metres). In the south and west are the valleys of San Judas, San Felipe, and Santiago, and the fertile plain of El Bajo. Rivers are: the Lerma, with its affluents the Laja and the Turbio, the Irapuato, and a number of smaller streams. There are many mineral springs, and one lake, 37⅓ square miles in extent, called the lake of blood (Yuririapundaro). Five mining districts merit special mention; namely, the Sierra Gorda, Allende, Santa Cruz, Guanajuato, and Leon, the principal

mines being those which produce silver and gold, silver, mercury or cinnabar, tin, iron, lead or argentiferous lead, and copper or argentiferous copper. In 1897, Dec. 31, there were 550 claims registered, of which number 80 were in process of development. (See statistics given in connection with the department and city of Guanajuato.) The climate, except in the higher parts of the mountain ranges, is not unfavorable (mean annual temperature about 70°). The rainy season extends from the middle of May until the beginning of July. During those months the rainfall is heavy in the valleys, but only moderate in the mountains. The value of agricultural products is about as follows: Corn, $7,000,000; barley, $190,000; wheat, $5,000,000; chile, $490,000; tobacco, $32,000; wool, $80,000. The total value of live stock is estimated at $10,000,000. The state is regarded as the most important mercantile centre of the republic. Its total trade, estimated at $67,000,000 per annum, is distributed as follows: Exports of minerals to Mexico city, the United States, and Europe, $20,000,000; exports of agricultural and other products to Mexican States, $10,000,000; exports of manufactured products, $2,000,000; imports from Mexico city, the United States, and Europe, $12,000,000; imports from other Mexican states, $3,000,000; the balance consisting of local trade. The chief imports are groceries, ready-made clothing, textiles, hardware, drugs, arms and ammunition, hats, canned goods, agricultural and mining machinery, and tools. There are 350 woolen mills, 853 cotton mills and 72 flour mills; also saddleries, potteries, powder-works, distilleries, tanneries, and foundries. Railway lines traversing the state are the Mexican Central, Mexican National, and Salamanca and Valle de Santiago. Principal towns have street-railways. The telegraph, telephone, and postal services of the state are moderately efficient. The state is divided into five departments, sub-divided into 31 partidos. Departments, with their chief towns, are: Allende, population, 161,904, principal towns San Miguel Allende and Dolores Hidalgo; Celaya, population, 277,321, principal town of the same name; Guanajuato, pop. 387,718, its principal town, of the same name, being the capital of the state (see GUANAJUATO CITY); Leon, population 142,157, principal towns Leon de los Aldamas and San Francisco del Rincón; and Sierra Gorda, population 93,456, principal towns San Luis de la Paz and San José de Iturbide. Consult *Mexico: a Geographical Sketch* (Washington, 1900).

GUANAJUATO CITY, Mexico, capital of the state of Guanajuato. It is situated in a narrow valley on the Guanajuato River, 252 miles by rail from Mexico city. Principal buildings are the state government palace, the Palace of Congress, mint, state college, churches, two theatres, hospitals, a bull-ring, Market de la Reforma,

Pantheon, and the Castle of Granaditas, where the heads of the patriots Hidalgo, Allende, Aldama, and Jimenez were hung on iron hooks during the war for independence. This city is the commercial centre of the state, and one of the most important in the republic. It is connected with the Central Railway by a branch line, and has street-railways, electric lighting, and other modern improvements. The mineral wealth of the district is indicated by the following figures: From 1812 to 1896 the combined value of gold, silver, and copper coined by the Guanajuato mint was $309,077,468.25, Mexican silver, the gold coinage being estimated at $21,178,328; silver, $287,884,476.25; and copper, $14,664. Pop. 53,000.

GUANAPARO, *gwâ-nâ-pâ'rō:* river of Venezuèla, S. America, rising in the dept. of Caraccas, and, after an easterly course of 230 m. joining the Portuguesa, which through the Apure sends its tribute to the Orinoco.

GUANCABELI'CA. See HUANCAVELICA.

GUANCHES: aboriginal and now extinct race of the Canary Islands, regarded by some as Libyans who fled thither on the conquest of Barbary by the Arabs, and by Humboldt as belonging to an old-continent race, probably the Caucasian. The former belief is strengthened by the fact that the few known words of their language are somewhat analogous to certain Berber dialects. They were large in stature, olive in complexion, and mild in character, believed in an invisible creator, an evil spirit, future happiness for the good and punishment for the bad, and embalmed their dead and preserved their bodies in catacombs.

GUANIDINE, *gwâ'-nĭ-dĭn;* a basic organic substance, having the empiric formula CH_5N_3, and the constitutional formula $HN:C(NH_2)_2$. It may be prepared by heating an alcoholic solution of cyanamide and ammonium chlorid to 212° F. Guanidine is a crystalline, deliquescent substance, with strongly alkaline properties, and it absorbs carbon dioxid from the air. It forms numerous salts, and urea is evolved in many of its reactions. In fact, it is this close relation with urea that gives guanidin its chief interest, many authorities holding the opinion that guanidine is an intermediate product in the formation of urea from proteid bodies, in the normal physiological chemistry of the body.

GUANINE, *gwâ'nĭn:* yellowish-white, amorphous substance, named from its being a constituent of guano; it, however, also forms the chief constituent of the excrement of spiders, has been found attached to the scales of fishes, e.g. the bleak; and seems a normal constituent of the mammalian liver and pancreas. Guanine belongs to that class of bodies formerly called bases, but which, from their combining equally with acids,

bases, or salts, are now often termed amides or amide-like compounds. By oxidation with permanganate of potash, it is converted into urea, oxalic acid, and oxyguanine, a substance not yet sufficiently studied. With regard to its occurrence in guano, as it has not been found in the recent excrement of sea-birds, there is every reason to believe that it is formed by slow oxidation (from atmospheric action) of the uric acid, much as uric acid can be made to yield urea and oxalic acid. And in the pancreas and liver it probably represents one of those transitory stages of disintegrated nitrogenous tissue finally excreted by the kidneys in the more highly oxidized form of urea.

GUANO, n. *gû-â′nō* or *gwâ′nō* [Sp. *guano*, or *huano*, from Peruvian, *huanu*, dung]: the name for deposits of the partially decomposed and dry excrementitious matter of sea-birds, but it has been also extended to accumulations of a similar kind from land-birds, and even from bats in caverns. Deposits from sea-birds are got wherever there is good feeding-ground in the neighborhood of unfrequented islands and rocky cliffs, and such may be seen around many shores. But to render them of practical utility atmospheric conditions are requisite which are only found in certain localities, and all the great guano deposits exist in the hottest and driest parts of the tropics, as on the islands of the South Pacific Ocean. The most important of all were the deposits on the Chincha Islands off the coast of Peru, which for years yielded a considerable revenue, but are now quite exhausted. The guano which was found there was from 60 to 80 or 100 feet in thickness, and was entirely due to the droppings, accumulated for many ages, of the innumerable seabirds which make these islands their resting-place and breeding-ground. The excrement which is at first pasty, rapidly dries by exposure to the sun in a part of the world where a fall of rain takes place once in a lifetime, and is looked upon as an historical event, and thus, while putrefaction is almost entirely arrested, the soluble salts of which guano to a great extent consists are retained. This guano, called technically Peruvian, is the most highly prized, and is regarded as a type of the substance; but quantities are or have been got from other localities, as Patagonia, various points of Bolivia, Mexico, and Chile, Malden Island and numerous other Pacific islands, new deposits being opened up as the older become less productive.

Guano varies extremely in composition, even in the same deposit considerable differences will be found; and when deposits from different localities are compared, there is sometimes no analogy except in the kind of substances present. Thus, some consist mainly of phosphate of calcium and other fixed salts, while others contain much volatile matter, with a large proportion of

ammonia. To the latter belongs Peruvian guano, which is a very light, dry, non-cohesive pale-yellow powder, with a characteristic ammoniacal odor, and sometimes containing lumps, made up of different salts. It is a very complex mixture, containing the urate of ammonium, the oxalates of ammonium and calcium, the phosphates of sodium, ammonium, calcium, and magnesium, the sulphates of potassium, sodium and ammonium, the chlorides of sodium and ammonium, and the carbonate of calcium. There is always some moisture, organic matter of different kinds, sand from the rock on which the deposit lies, and this is sometimes considerable. These may be regarded as the possible constituents of guano, but the ingredients which are especially prized are the ammoniacal salts, the phosphoric acid, in combination with the alkalies and alkaline earths, and the alkalies themselves, particularly the potash. It is the remarkable abundance of these constituents and their fine intermixture which makes genuine Peruvian guano so much esteemed as a manure. It contains almost all the inorganic matter required by a plant, and that in a highly available form, so that it is one of the best of all fertilizing agents for different crops. Its use as a manure was known to the native Peruvians centuries ago, but no attention was paid to the accounts by modern travelers of its wonderful efficacy until A. von Humboldt took some to Europe, in 1804, and had it analyzed. It was not exported on a large scale till about 1850, and from that time the quantity sent to foreign countries, including large shipments to the United States, was very great, but the supply has latterly much fallen off.

As a substitute for ordinary guano, what is known as fish-guano has been in use for a considerable number of years. This consists essentially of fish and fish offal dried and powdered. In the case of oily fish, such as herrings, it is necessary to extract as much of the oil as possible before the operation of powdering; and it will thus be understood that different kinds of fish differ greatly as regards their value for manurial purposes. But all sorts of fish-guano contain a large percentage of ammonia and phosphate of lime, and are thus valuable as fertilizers.

GUANTANAMO, *gwân-ta-nā'mō:* a town and bay on the s. coast of Cuba; 38 m. e. of Santiago. The town and fort from which the bay takes its name lie about 5 miles back from the coast. To the left of the entrance is a strip of low, swampy land, and on the right rises a range of steep, rocky hills. On these bluffs the Spaniards had thrown up earthworks and dug rough rifle pits comanding the entrance. In 1898, June 10, the U. S. cruiser *Marblehead* was sent to shell these works, and the following day the transport *Panther* took possession of the hill, and landed 600 marines at Cai-

manera. It was just outside of the bay that the U. S. war vessels tried to destroy the cables which extended from Guantanamo to Santiago and then to Spain. In 1903 the Cuban government ceded to the United States the bay and vicinity for a naval station.

GUAPEY, *gwâ'pā:* river of S. America, rising in Bolivia, joining the Mamore on its way to the Amazon, after a winding course of 550 miles.

GUAPORE, *gwâ-pō'rā:* river of S. America, rising in Brazil, and, after a course of 400 m., uniting with the Mamore to form the Madera, affluent of the Amazon.

GUARANA, n. *gwă-rā'nă,* or GUARANA BREAD [after a tribe of Indians so named]: the Brazilian cocoa of Brazil, a food prepared by the savages from the seeds of a plant supposed to belong to the genus *Paullinia* (nat. order *Sapindaceœ*), which has been called *P. sorbilis.* The dried seeds are powdered, mixed into a paste, rolled into cylindrical cakes, and dried. These are regarded as very efficacious in many disorders; they contain, besides other substances, some nutritious, a considerable quantity of a substance supposed identical with theine or caffeine, and named Guaranine. The Brazilians pound the Guarana Bread in water, sweeten it, and use it as a stomachic and febrifuge. It is also reputed aphrodisiac.—The genus *Paullinia,* contains several species remarkable for extremely poisonous properties. GUARANINE, *gwā'ră-nĭn,* a bitter crystalline matter found in Guarana bread.

GUARANTEE, n. *găr'ăn-tē',* or GUAR'ANTY, n. *-ăn-tĭ* [F. *garantir,* to warrant, to vouch; *garantie,* warranty—from mid. L. *wărantus:* It. *guarentia,* guarantee, surety]: engagement to be answerable for a payment, or for a performance of any duty, by another; the person or party who so makes himself answerable for another. V. to engage that certain stipulations shall be performed by another person; to undertake to secure to another; to make certain. GUAR'ANTEE'ING, imp. GUAR'ANTEED, pp. *-tēd.* GUAR'ANTOR, n. *-tŏr,* one who guarantees: see WARRANT. *Guaranty,* in Law, is a contract by which one person binds himself to pay a debt or do some act in case of the failure of some other person, whose debt or duty it is to do the thing guaranteed. The person so binding himself is usually called in England the surety, in Scotland the cautioner, in the United States frequently the guarantor; while the person primarily liable is called the principal. Thus, where A borrows money, and B joins as a party in a bill of exchange or a bond to secure the loan, B is a surety or guarantor. Where B guarantees that certain goods supplied to A shall be paid for, he is more usually styled a guarantor than a surety, but the liability is the same.

Such a contract must be in writing; a surety can be bound only by some writing signed by himself or his agent. Similarly with one making representations as to

the character, ability, or dealings of another, with intent that the latter may obtain credit. In order to bind the surety, there must also be no deceit or misrepresentation as to the nature of the risk or as to the state of the accounts. If a guarantee is given to a firm, it is not binding after a change in the firm, unless the parties expressly stipulate to that effect. If the creditor discharge the principal, or even give time, by way of indulgence to him, the surety is released, for he is thereby put to a disadvantage. In general, the creditor can sue either the principal or the surety for the debt, at his option. If the surety is obliged to pay the debt of his principal, he can sue the principal for the money so paid, and is entitled to have all the securities assigned to him, to enable him to do so more effectually.

GUARAPO, n. *gwă-râ'pō:* a name given by the negroes to sugar cane wine—that is, the intoxicating liquor resulting from the spontaneous fermentation of the sap of the sugar-cane.

GUARD, v. *gârd* [F. *garder*, to keep: It. *guardare*, to look, to guard: O.H.G. *warten*, to watch over: comp. Gael. *gaird*, an arm, a hand]: to watch over; to protect; to defend; to keep in safety; to be cautious: N. defense; preservation or security against loss or injury; that which defends or protects; caution of expression; a body of men for defense or security; state of caution or vigilance; in *bot.*, applied to sister cells bounding a stoma, formed by bipartition of a mother cell; in *zool.*, the cylindrical fibrous sheath with which the internal chambered shell of a belemnite is protected; in *fencing*, a posture of defense; part of the hilt of a sword; in *mil.*, a body of men kept on a particular duty for a certain time, as guarding a gate or a barracks; in *OE.*, an ornamental lace or border. GUARD'ING imp. GUARDED, pp. *gârd'ĕd:* ADJ. cautious; framed or uttered with caution. GUARD'EDLY, ad. *-lĭ.* GUARD'EDNESS, n. GUARD'ER, n. one who guards. GUARD'FUL, a. wary; cautious. GUARD'IAN, n. *-ĭ-ăn* [F. *gardien*]: one who has the care or protection of any thing or person: in *law*, see below; ADJ. protecting. GUARDIAN ANGELS (see ANGELS). GUARD'IANSHIP, n. the office of guardian. GUARDAGE, n. *gâr'dāj*, in *OE.*, state of one who is under a guardian; state of wardship. GUAR'DANT, a. *-dănt*, in *OE.*, exercising the authority of a guardian; in *her.*, usually, GARDANT, having the face of the animal turned in the direction of the spectator: N. in *OE.*, a guardian; a protector. GUARDS, n. plu., general name for the regiments of household troops. LIFE GUARDS, cavalry of household troops; a body of select troops for the protection of a prince. GUARDSMAN, *gârdz'măn*, a soldier of the Guards. ADVANCED-GUARD, or VANGUARD, a body of troops marching some distance in front of an army to prevent surprise, or to give notice of danger. DISMOUNTING GUARD, the act of coming off guard. MOUNTING GUARD, the act of

going on guard. GUARD OF HONOR, a body of troops drawn up to receive eminent personages as a mark of respect. QUARTER-GUARD, the guard posted in front of a camp. REAR-GUARD, a body of troops that march behind an army for its protection against surprise, or are posted in rear of a camp. GUARD-ROOM, a room for the accommodation of soldiers on guard. GUARD-SHIP, a vessel of war appointed for service in a harbor or river. ON GUARD, acting or serving as a guard.—SYN. of 'guard, v.': to keep; watch; shield; secure; shelter; preserve.

GUARDAFUI, *gwâr-dâ-fwē'* CAPE (anc. *Aromatum Promontorium*): the most eastern point of the African continent, the extremity of an immense promontory stretching seaward e.n.e., washed on the n.w. by the Gulf of Aden and on the s.e. by the Indian Ocean. The cape is in lat. 11° 50′ n., long. 51° 20′ east.

GUARDIA-GRELE, *gwâr'dē-â-grā'lā:* small and unimportant town of s. Italy, province of Chieti, 12 m. s.s.e of the town of Chieti. Pop. 8,000.

GUARD'IAN, in Law: legal representative and custodier of the person or estate (or both) of an infant, i.e. one under the age of 21: various kinds are distinguished. (1) *Guardians by nature*, in the United States, the father, and on his death the mother, who has charge of the person and estate of all the children; (2) *guardian by nurture*, in England, first the father, then the mother, who has charge of the persons of all children, not heirs-apparent, till they reach the age of 14 years (obsolete in the United States); (3) *guardian in socage*, custodian of the person and land or estate of an infant under 14 years of age, usually a relative who could not inherit from the infant (superseded in the United States by [5]); (4) *guardian by estoppel*, one who illegally undertakes the management of an infant's property and receives its profits (see ESTOPPEL); (5) *guardian by chancery*, in England one appointed by the court of chancery to take charge of minors and their estates. In the United States this guardian is appointed by courts of equity and probate or surrogate courts; (6) *guardian by statute*, one appointed by deed or will of infant's parents or by a court in pursuance of a statute; (7) *guardian 'ad litem,'* person appointed by a court to protect an infant's interests in a suit in law; (8) *guardian by testament*, one appointed by the last will of a father, under the control of a court, removable for mismanagement, and responsible till the infant becomes of age.

In corresponding cases in Scotland, the custody of a child under 12, if female, or 14, if male, belongs to her or his tutor (q.v.): and from those ages to 21, the child has no legal guardian, being *sui juris;* but the care of the child's property belongs to a curator.

Guardian of the poor, is in English parochial law an important functionary, being a person elected by a

parish or union of parishes to manage the affairs of the poor, acting in the place of the ancient parish overseers of the poor. Many large parishes are under a board of guardians, and all poor-law unions are managed by guardians.—In Scotland, the corresponding duties are discharged by the Parochial Board (q.v.), subject to the general board of supervision. See POOR.—As to guardian of a lunatic, see LUNATIC.

GUAREA, *gwā'rē-a:* genus of tropical American trees of nat. ord. *Meliaceæ*, of some of which the bark is used as an emetic and purgative. *G. grandifolia* is called MUSK-WOOD in some islands of the W. Indies; the bark smelling so strongly of musk, that it may be used as a perfume.

GUARINI, *gwâ-rē'nē*, GIOVANNI BATTISTA: 1537, Dec. 10—1612; b. Ferrara: Italian poet. He studied in the universities of Pisa, Padua, and Ferrara, and was appointed to the chair of literature in the latter, and soon published some sonnets which obtained great popularity. At the age of 30, he accepted service at the court of Ferrara, and was intrusted by Duke Alfonso II. with various diplomatic missions. He withdrew from the court about 1587. Having resided successively in Savoy, Mantua, Florence, and Urbino, he returned to his native Ferrara. He died at Venice, whither he had been summoned to attend a lawsuit. An irascible sensitiveness, joined to an exaggerated estimate of his personal dignity, neutralized many qualities both brilliant and solid, which seemed to fit Guarini exactly for a court career. To these defects, in part, may be attributed the frequent mortifications which tracked him through life. As a poet, he is remarkable for refined grace of language and sweetness of sentiment, while his defects are occasional artificiality, a too constant recurrence of antithetical imagery, and an affected dallying with his ideas. His chief work, *Il Pastor Fido* (The Faithful Swain), is regarded in Italy as a standard of elegant pastoral composition. The writer designed it as a tragicomic pastoral; its first dramatic representation was in honor of the nuptials of the Duke of Savoy and Catherine of Austria, 1585. It ran through 40 editions during Guarini's life and was translated into almost all the modern languages. Its superb and perfect diction is flooded with sensuousness, and with a wanton love whose immodest expression is dangerously veiled with perfect rhetorical artifice and moving always within the limits of decorum. Cardinal Bellarmine told Guarini that he had done more harm to Christendom by his blandishments in poetry than Luther by his heresies in theology. Tasso and Guarini (Tasso's birth was seven years after that of Guarini) have been frequently compared; the two poets were literary friends and reciprocal admirers, though rivals in love. Guarini's varied writings, including sonnets, comedies, satires, and po-

litical treatises, were published at Ferrara 1737, 4 vols. 4to.—See *Storia della Letteratura Italiani del Tiraboschi.*

GUARINO, *gwâ-rē'nō,* or GUARINUS, *gwâ-re'nîa* [Lat. *Varinus*): a learned Italian: 1370–1460, Dec. 14; b. Verona. He went to Constantinople 1388 to learn Greek under Chrysoloras. After his return he taught in Verona, Padua, and Bologna, was tutor to Prince Lionella of Ferrara, acted as interpreter at the council of Ferrara, and died at Ferrara. He rendered great services in the revival of classical studies; translated the first ten books of Strabo, and a portion of Plutarch; commented on Cicero, Persius, Juvenal, Martial, and Aristotle; and wrote a *Compendium Grammaticæ Græcæ,* printed in Ferrara 1509. Compare Rosmini, *Vita e Disciplina di Guarino* (3 vols. Brescia 1805–6.

GUATEMALA, *gaw-tē-mâ'la,* Sp. *gwâ-tā-mâ'lâ,* REPUBLIC OF (REPÚBLICA DE GUATEMALA), the largest country in Central America; bounded on the n. by Mexico, British Honduras, and the Gulf of Honduras; on the e. and s.e. by British Honduras, the Gulf of Amatique, Honduras, and Salvador; on the s. and s.w. by the Pacific Ocean; and on the w. by Mexico. Its area is estimated at 47,810 or 48,290 sq. m.; its territory extending from lat. 13° 42′ to 17° 49′ n., and from long. 88° 10′ to 92° 30′ w.—Guatemala is divided into 22 departments, and each department subdivided into municipal districts, the total number of the latter being 331. Again, for electoral purposes, the whole republic is divided into 38 *distritos electorales.* Pop. 1,804,000.

Topography and Physical Geography.—The mountains of Guatemala are commonly referred to as 'Cordillera of the Andes,' 'Guatemalan Andes,' or simply 'Andes,' though there is no propriety in those names. The Guatemalan mountains belong to the Antillean system; its ranges, composed of folded sedimentaries, in eastern Guatemala have an east-and-west trend. But the ranges near the Pacific coast of the republic, crossing the western ends of the Antillean corrugations diagonally, or with a northwest-and-southeast trend, must be assigned to still another class; they form a part of the volcanic chain which extends along the entire western coast of Central America, and is continued in Mexico. The Sierra Madre is the principal range of the w. and s.; in the central and eastern districts are the Sierra de Chama, Sierra de las Minas, Sierra de Santa Cruz, and the Sierra de Copán—the last named on the frontier of Honduras. The highest points of the Cordillera are given as: Tajumulco volcano (12,600 feet), Tacaná volcano (12,400 feet), both in the s.w.; Acatenango volcano (11,100 feet), south-central; and the volcano de Fuego (11,400 feet), also south-central.

Hydrography.—Rivers emptying into the Gulf of Mexico are: the Usumacinta, on the Mexican frontier, and

the Cuilco and Salequa, which are also tributaries of Mexican streams. The following empty either into the Gulf of Honduras or Izabal Lake (Golfo Dulce): the Montagua, Rio Hondo, the Dulce, the Belice, the Sarstoon, and the Polochic. Those which flow into the Pacific are: Rio de los Esclavos, Rio de Paz, the Michatoya, Guacalate, Coyelate, Patulul, Nagualate, Samalá, Tilapa, Naranjo, and Suchiate. Steamship navigation has been established on the Dulce and Polochic rivers; seven or eight of the others are navigable for small boats. The most important lakes are: Atitlán and Izabal (both navigated by steamers), Petén, Amatitlán, Ayarza, and Güija (on the frontier of Salvador).

Geology.—The calcareous formations of the Antillean ridges and, generally, the eastern and central regions, deserve special mention. Volcanic products characterize the Pacific slope and Sierra Madre, where they occur in connection with granitic rocks porphyries and trachytes. See also CENTRAL AMERICA.

Mineral Resources.—Gold and silver are found near the Montagua River and elsewhere; salt in the departments of Alta Verapaz and Santa Rosa. Other minerals reported to exist are: coal, lignite, manganese, lead, tin, cinnabar, copper, kaolin, opals, slate, alum, antimony, marble, alabaster, sulphur, ochre, asbestos, plumbago, chalk, and bitumen. A belt of country extending from the coast range of mountains on the western frontier, near the Pacific, across the Sierra Madre to the coast range of the Caribbean slope, is regarded as essentially a mineral territory, in which there has been comparatively little exploiting or prospecting, though enough to reveal the presence of the precious and base metals.

Climate.—The lowlands of the Pacific and Atlantic coasts are torrid; interior table-lands, at an altitude of 2,000 to 5,000 feet, have an agreeable climate; and the high districts, where the elevation is more than 5,000 feet, are decidedly cool. As is shown in the list of places given under 'Political Divisions,' the larger towns are built in the temperate or cool zones. The rainy season, beginning in May, lasts until Oct. in the interior, but sometimes until Dec., on the coast. Dec. and Jan. are the coldest months; Mar. and Apr. the hottest. Snow sometimes falls (in Dec. or Jan.) on the uplands of the cool zone.

Flora and Fauna.—The rich soil and varying climatic conditions favor a wide range of products in the vegetable kingdom; no systematic classification of these, however, has yet been made. The extent of the forest land, which abounds in mahogany, is estimated at 1,300,000 acres. The fauna and avifauna resemble those of Costa Rica in general, but especially characteristic of Guatemala are the aquatic birds on its rivers and lakes, and the quetzal. Mexican deer are quite numerous. The

tapir, honey-bear, armadillo, wild pig, cougar, jagua, etc., are found as in other parts of Central America. The over-abundance of insect life is particularly noteworthy.

Agriculture.—Coffee grows in the regions between 1,000 and 6,000 feet above the sea-level; sugar-cane, between sea-level and 6,200 feet; cacao in the lowlands or those regions having an altitude of less than 3,000 feet. Tobacco, wheat, maize, and beans, are also produced in large quantities. Coffee exports in one year have amounted to 85,373,223 pounds, with a value of $7,390,477 gold. The ordinary annual yield of tobacco is given as 1,000,000 pounds; of cane-sugar, 41,000,000 pounds; bananas, 1,000,000 bunches; and cacao, 200,000 pounds. Stock-raising has been encouraged in the departments of Izabal, Zacapa, Petén, and Alta Verapaz, by decrees authorizing the political chiefs of those departments to make grants of land to persons who establish ranches. Money premiums have been offered to cultivators of india rubber, cacao, sarsaparilla, and hemp; grants of land to those who engage in the cultivation of wheat and bananas.

Commerce.—Exports to the United States in the fiscal year ending 1906, June 30, were valued at $3,386,317; imports from the United States at $2,908,665. The principal exports are coffee, sugar, bananas, hides, india rubber, timber, etc. Of the imports, about one half in value are supplied by the United States, and one quarter by Great Britain, the chief imports being flour, cotton goods, machinery and manufactured iron, and preserved meats and other articles for food. The total value of imports was $6,844,000 in 1905 and of exports $8,238,000.

Manufactures.—For the partial supply of local needs a number of small establishments are maintained, the chief industries being the preparation of ramié fibre and the manufacture of coarse textiles, hats, shoes, pottery, cigars, foundry products, musical instruments, furniture, agricultural implements, and liquors.

Weights, Measures and Money.—The French metric system is used, concurrently with the old Spanish system of weights and measures. The latter has: *Onza* (ounce), *libra* (pound, strictly 1.043 pounds), *arroba* (25 *libras*), *quintal* (100 *libras*), *tonelada* (ton 20 *quintals*), and *fanega* (1½ bushels). The monetary unit is the silver *peso* (value in United States gold or silver, $0.384). The money in actual use is paper currency and fractional nickel coins.

Banking and Finance.—Six banks are authorized to issue paper, namely: International Bank of Guatemala (Banco Internacional de Guatemala), Colombian Bank (Banco Colombiano), Western Bank Banco de Occidente), Commercial Bank of Guatemala (Banco Comercial de Guatemala), American Bank (Banco Americano), Guatemala Bank (Banco de Guatemala). All

of these, except the Banco de Occidente, have their headquarters in Guatemala City. In 1905 the revenues were $2,673,290 and the expenditures $3,562,935. The total funded and refunded debt is $14,148,366.

Government.—The legislative power is vested in the National Assembly (a single house), whose members (deputies) number one for every 20,000 inhabitants, and are elected for four years by popular vote. The executive power is vested in a president, elected for six years by direct vote of the people. He is responsible for his acts to the assembly, and cannot be re-elected until after an interval of at least one term. The administration is carried on, under the president, by six 'secretaries of state,' each of whom has charge of a separate department (*ministerio*). These departments are: Government and Justice, Foreign Relations, Public Instruction, Promotion of Public Welfare (*Fomento*), Finance and Public Credit, and War. The council of state is an advisory board, of which certain members are chosen for the assembly and others appointed by the president.

Army.—The army consists of about 7,000 men in regular service; effective army, 56,900 men between the ages of 18 and 30; reserve, 30,000 men from 30 to 50 years of age.

Education.—Public instruction, supported by the government, is secular and gratuitous; primary instruction is obligatory; free education is guaranteed by the Constitution. In 1901 there were 1,030 schools in the republic, 455 being for males, 379 for females, 146 mixed, and 50 night schools. In Guatemala City there were 53 schools, of which number 25 were public, under government inspection; and among the private institutions was a school for boys and girls of the German colony only, endowed by the German government. Higher instruction was given in the capital at the National Institutes (one for men and one for young women), to which normal departments were attached; and similar institutes existed at Quezaltenango (before its destruction) and Chiquimula. There is a separate normal school for young women at Guatemala City, and normal schools for young men at Antigua, San Marcos, and Mazatenango. Schools of law, medicine, and engineering are mainly supported by private funds, but receive aid from the public treasury. Education in music is supplied at the National Conservatory and a number of local schools. There are also trade schools (including one for women) a commercial college, and an art school. The national library contains 30,000 volumes and many valuable unpublished documents.

Religion.—The constitution guarantees liberty of conscience. The government recognizes no creed. The prevailing religion is Roman Catholicism.

Judiciary.—The supreme court of justice consists of

a chief justice and four associates, elected by the people. There are six courts of appeal, each consisting of a chief justice and two associates, also elected by the people. Courts of the first instance are 29 in number: their judges are selected by the president among the candidates approved by the chief justice of the supreme court.

Local Government.—The 'Political Chief' (*Jefe Politico*) of each department of the republic is appointed by the president, whose authority he exercises in provincial matters. The local officials locally elected are: the *Alcaldes* (one or more for each municipal district) and the *Regidores* (members of the municipal council). *Alcalde* and *Regidor* correspond to mayor and alderman; the *jefe politico* takes the place of a governor, and his relation to the chief executive in a centralized republic fairly indicates the limits within which local self-government is permitted.

History.—Pedro de Alvarado, one of the lieuts. of Cortés in 1523–4 conquered the country, and in 1524, July 25, proclaimed the sovereignty of Spain at Almolonga, the native town which was afterward to be known as Santiago de los Caballeros. After the conquest all of the territory now divided up among the Central American countries was included in the captain-generalcy of Guatemala. Independence was proclaimed 1821, Sep. 15; annexation to the Mexican empire under Iturbide followed 1822, Jan. 5. An assembly of representative citizens of Guatemala and the other Central American provinces in 1823, July 1, declared the whole country to be independent, with reference to Mexico, Spain, and all other nations, 'whether of the Old or of the New World.' Accordingly the United Provinces of Central America came into existence. Guatemala seceded from this union 1839, Apr. 17. The name República de Guatemala was assumed 1847, Mar. 21. Between 1839 and 1851 there was a series of bitter struggles with Salvador for supremacy, fortune favoring the smaller republic; but in the year last mentioned Guatemala began to be successful, and, under the leadership of Rafael Carrera (president until 1856, and subsequently life-president or dictator), carried the war into Salvador (1863) and regained the controlling position in Central America. Carrera appointed his own successor, and died in 1865. The next significant administration was that of Gen. Justo Rufino Barrios, who was put in office by the Liberals, after their onslaught upon the Jesuits. Barillas was elected to the presidency in 1886. In 1890 and 1891 the progress of the country was checked by epidemics of cholera and smallpox. In 1892, Mar. 15, José Maria Reina Barrios was inaugurated as president, and by a decree of the National Assembly (1897, Aug. 30) his term was extended to 1902, Mar. 15—in direct violation of the Constitution, which was proclaimed in 1879 and modified in 1885, 1887, and 1889. He was assassi-

nated 1898, Feb. 8, by a British subject of German origin. Dr. Manuel Estrada Cabrera was proclaimed acting president, and received the support of the army. An insurrection begun under Gen. Castillo's leadership July 28 was put down, but only to be quickly followed by another revolutionary movement. Insurgent forces commanded by Morales offered a stubborn resistance in the southwest, until Morales was captured. When peace had been restored, Cabrera was the only candidate for the presidency, and his election was announced 1898, Sep. 25. In the following year the government of Guatemala made a proposition which was equivalent to repudiation of a part of its foreign debt, but yielded to Germany's protest—or threat to use force—and withdrew the discreditable suggestion. Earthquakes which occurred in 1902, Apr., caused great damage in several districts. Amatitlan, Mazatenango, San Marcos, Sololá, and San Felipe suffered severely, and Quezaltenango, in importance the second city of the republic, was totally destroyed. An eruption of the volcano Santa Maria followed on Oct. 24, and there were outbursts from new craters in Nov. Several thousand persons lost their lives through these disasters, and the injury to property (plantations, buildings, machinery, and cattle) has been estimated at $5,000,000 to $10,000,000. Taxes for the relief of the earthquake sufferers were imposed by the Legislative Assembly 1902, Apr. 24. A convention between the United States and Guatemala relating to the tenure and disposition of real and personal property was signed 1901, Aug. 27, and ratifications exchanged at Guatemala 1902, Sep. 16. See also CENTRAL AMERICA.

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GUATEMA'LA, OLD: city in Guatemala, Central America, at the foot of Volcan d'Agua; lat. 14° 30′ n., and long. 90° 45′ w. Formerly cap. of the country, and one of the richest and most beautiful cities of Spanish America (pop. more than 60,000), it was twice destroyed, 1541 by an eruption, and 1773 by an earthquake. Though, after the second disaster, it was supplanted by its more modern namesake, yet it was, to a certain extent, rebuilt. It is frequently called Antigua (Old). Many of its ancient buildings, especially a cathedral and a palace, remain entire. Pop. abt. 20,000.

GUATEMALA, or SANTIAGO DE GUATEMALA, *sân-tē â′gō dā,* or GUATEMALA LA NUEVA, *lā nô-ā′vâ* (the New), cap. of the republic of Guatemala; founded 1775, in a

rich and spacious table-land, 4,961 ft. above the sea; lat. 14° 37′ n., and long. 90° 30′ w. It is 24 m. e.n.e. of the original cap., Guatemala Antigua. The people manufacture muslins, cotton-yarn, plate, artificial flowers, and beautiful embroidery, carrying on at the same time a prosperous trade in the agricultural productions of the neighborhood. It is a well-planned town, covering a large area; the streets are wide and straight, lighted by electricity, and have lines of street railways. Principal buildings: the palace of the president, city hall, court-house, post and telegraph office, artillery barracks, custom-house, liquor and tobacco bureau, national theatre, college of medicine and pharmacy, university, school of arts and trades, polytechnic school, palace of the archbishop, the cathedral and several other fine churches, the penitentiary, and the hotels. The city has public gardens, telephone and telegraph service, and is connected by rail with the port of San José. Pop. 74,527.

GUATEMOZIN, *gwâ-tē-mō′zĭn* or *gwâ-tā-mō-sēn′*: last Aztec emperor; about 1495-1525, Feb. 15; b. Mexico. He was nephew and son-in-law of Montezuma, and became emperor on the death of Montezuma's brother 1520. He immediately took vigorous measures to continue the defense of Mexico City against the Spanish attacks begun during the reign of his predecessor, and when his preparations were nearly completed Cortes, and his army appeared before the capital 1521, Apr. 28, and laid siege to it. The Mexicans held out till famine and pestilence compelled their surrender. Guatemozin was urged by his people to flee for safety, and after many entreaties attempted to escape, but was pursued and captured near Lake Tezcuco. For some time he was treated considerately by Cortes, but when the Spaniards failed to find as much booty as they had expected he was unavailingly subjected to torture. He lived in the capital in semi-liberty till 1524, when Cortes took him on his expedition for the conquest of Honduras. In the following winter he was falsely accused of plotting to kill Cortes and other chiefs, and after a brief investigation was put to death.

GUAVA, n. *gwâ′vă* [Sp. *guayaba*], (*Psidium*): genus of trees and shrubs of nat. ord. *Myrtaceæ*, mostly natives of tropical America, some of them yielding valued fruits. They have opposite entire, or almost entire leaves, a 3—5 lobed calyx, 4—5-petals, and 1—5-celled berry with many-seeded cells.—The Common Guava or White Guava (*P. pyriferum*), (variety of the species *P. Guayava*, which produces most of the Guava fruits of commerce), is a low tree of 7—20 ft., with numerous branches, obtuse smooth leaves 2—3 inches long, and fragrant white flowers on solitary axillary stalks. It is said to be a native both of the E. and of the W. Indies, and is now much cultivated in both. It was probably introduced into the E. Indies from America,

but has now become fully naturalized. The fruit is larger than a hen's egg, roundish or oblong, smooth, yellow; the rind thin and brittle; the pulp firm, full of bony seeds, flesh-colored, aromatic, and sweet. The jelly or preserve made from it is highly esteemed, and is now regularly exported from the W. Indies and S. America. The rind is stewed with milk, and is also made into marmalade. This fruit is rather astringent than laxative. Guava buds, boiled with barley and liquorice, make a useful astringent drink in diarrhœa.—The RED GUAVA (*P. pomiferum*), also now common in the E. as well as in the W. Indies, produces a beautiful fruit, with red flesh, but not nearly so agreeable as the white guava. It is very acid. The CHINA GUAVA (*P. Cattleyanum*), native of China, is a larger tree than the white guava: the fruit is round, about the size of a walnut, of a fine claret color, growing in the axils of the leaves; the pulp purplish red next the skin becoming paler toward the centre, and there white, soft, subacid, and of very agreeable flavor. It makes an excellent preserve. It thrives in the open air in s. France.—On some of the mountains of Brazil grows a dwarf species of Guava, called Marangaba (*P. pygmœum*), a shrub 1—2 ft. high, with fruit about the size of a gooseberry, much sought on account of its delicious flavor, resembling that of the strawberry.—The BASTARD GUAVA of the W. Indies is a species of *Eugenia* (q.v.).

GUAXA'CO. See OAJACO.

GUAYAQUIL: river in Ecuador, the only stream on the w. coast of S. America which can, without qualification, be said to be navigable for sea going vessels. It is navigable for about 110 m. to Caracol, and is known in its upper course successively as the Caracol and Babahoya.

GUAYAQUIL, *gwī-â-kēl:* department in Ecuador, extending from the Pacific on the w. to the departments of Quito and Assuay on the e., comprising a much wider belt of low and level land than is generally found further s. between the Andes and the sea.

GUAYAQUIL BAY: bay on the coast of Ecuador, which receives the Guayquil river; in s. lat. between 2° and 4°, and in w. long. between 80°and 81°. It receives also the Daule and the Tumbez.

GUAYAQUIL, or SANTIAGO DE GUAYAQUIL: city, cap. of the dept. of Guayaquil; principal seaport of Ecuador, on the right bank of the river Guayaquil, 40 m. from its mouth. It is divided into two parts, the old and the new. The houses are mostly of wood; the principal buildings are the cathedral, the two hospitals, and the two colleges, the last of which have faculties of theology, philosophy, and law. Guayaquil possesses the best, perhaps the only really good harbor on the Pacific shores of S. America, the naturally deep channel being aided by

a tide which sometimes rises and falls 24 ft. Occupying a low level site, and being in lat. 2° 11′ s., the place is necessarily unhealthful. Recently, however, the town has been drained, and the river dredged, and good water has been introduced. It has an extensive trade. Over half of the total foreign commerce of Ecuador centering here. The city contains a college and is the see of a bishop. The chief articles of imports are cottons (more than a quarter of the whole), woolens, wines, spirits, grocery, soap, etc., metals, flour, and linens, and of exports, cocoa, straw-hats, timber, bark, hides, orchilla, tobacco, sarsaparilla, canes, india-rubber, coffee, and precious metals. Pop. about 51,000, mainly mulattoes, mestizos, and Indians.

GUAYRA, La or La Guaira, *gwī′rä:* principal seaport of Venezuela, S. America; on a narrow strip of land between the mountains and the sea, about 5 m. from Caraccas, of which it is the port. The town is strongly fortified. The harbor is an open roadstead of the Caribbean Sea, and the anchorage is unsafe; but the trade of the port, which is entered annually by about 200 vessels, is extensive. The chief exports are copper ore, cocoa, dye-woods; coffee, formerly the most important, has of late declined. The principal imports are woolens, calicoes, guns, cutlery, and chinaware from Great Britain; wines from France and Germany; flour, wheat, petroleum, machinery, and cotton goods from the United States. Pop. abt. 7,000.

GUBERNATORIAL, a. *gū′bėr-nā-tō′rĭ-ăl* [fr. L. *gubernator*, pilot]: of or pertaining to a governor or his office.

GUDGEON, n. *gŭj′ŭn:* iron pin or shaft on which a wheel turns.

GUDG′EON (*Gobio*): genus of fishes of the family *Cyprinidæ*, having a short dorsal fin, a short anal fin, and no strong serrated ray in either, the body covered with rather large scales, and barbules at the angles of the mouth. The Common Gudgeon (*G. fluviatilis*), is abundant in many rivers of Europe and Asia that have gravelly bottoms, and occasional pools and rapids. It seldom exceeds eight inches in length; the depth is not one-fifth of the length. The tail is forked. The eye is high on the side of the head. The upper parts are olive brown, spotted with black; the under parts white. Gudgeons swim in shoals. They feed on worms, mollusks, and other small animals, and are extremely ready to bite at a bait, commonly a small piece of a red worm.

GUEBRES, *gā′bėrz* or *gē′bėrz*, or Ghebres, or Ghebers, *gā′bėrz*, or Gabres, or Ghavres (Turk *Ghiaur* or *Ghaur*): followers of the ancient Persian religion as reformed and consolidated by Zerdusht (Zoroaster). This name, Guebres (compare Giaour), commonly, but against all linguistic laws, derived from the Arabic

Kafir (a word applied to all non-Mohammedans, and supposed to have been bestowed on this sect first by their Arabie eonquerors in the 7th e.), is evidently an ancient proper name of some pre-eminent tribe or locality, since the Talmud (Jebam. 63 b., Gitt. 17 a., etc.) knew them only by this name (Cheber); and Origen (*Contra Cels.* vi. 291) speaks of Kabirs or Persians, asserting that Christianity has adopted nothing from them. They are also called *Atesh Perest*, or fire-worshippers; *Parsees*, or people of Pars or Fars—i.e., Persia; *Madjoos*, from their priests the Magi; and by themselves *Beh-Din*, 'Those of the exeellent belief;' or *Mazdaasnan*, worshippers of Ormuzd. For the origin, nature, and early history of this religion, see ZOROASTER: ZEND-AVESTA: SUN-WORSHIP. When the Persian empire became subjeet to the Mohammedan rule, the great mass of the inhabitants were converted to the religion of Islam. A very small number still clinging to the ancient religion, fled into the wilderness of Khorassan, or the island of Hormuz; but even this remnant was for many centuries under constant oppression. Mahmoud the Ghiznevide, Shah Abbas, and others, are conspieuous for untiring perseeution of them; and the manner in whieh they were held up to general detestation is best shown by the position assigned them in most popular Mohammedan tales as sorcerers and criminals. At present there are, according to the latest native information, about 8,000 Guebres seattered over the vast dominions of their ancestors, ehiefly in Yezd and 24 surrounding villages. There are a few at Teheran, a few at Ispahan, at Shiraz, and some at Baku, near the great naphtha mountain, but all plunged in the depths of ignorance, and, with very few exeeptions, of poverty. They have a high reputation for honor, probity, obedienee to the law, chastity, and endurance. Another portion, after various migrations—which are told at length in the *Kissah-i-Sanjan*, written by Behram (1599)—reaehed India, where they are now settled under the name of Parsees, chiefly in Bombay: they are very numerous, forming a population of more than 50,000, or about 8 per cent. of the whole population. See PARSEES.

GUELFS AND GHIBELLINES, *gwĕlfs*, *gĭb'ĕl-lĭnz*, It. *ghĕ'bĕl-lēnz* (often GUELPHS and GHIBELLINES): names of two great parties, the reeord of whose conflicts may be said to be almost the history of Italy and Germany from the 11th to the 14th e. The origin of these names was formerly a subjeet of speeulation; but antiquaries are now agreed in tracing them respectively to the two families, Waiblingen and Welf, which, in the 12th e., were at the head of two rival parties in the German empire, and whose feuds came to be identified historically with the respective principles for which these parties contended. Welf was a personal name of a prehistoric founder of the family still represented under the

name of Guelph in the royal (English) and ducal houses of Brunswick; Waiblingen, a small town in Würtemberg, was a possession of the house of Hohenstaufen. The assumption of the names as party names is usually assigned to the great battle of Weinsberg, Suabia, 1140, in which Emperor Conrad of Hohenstaufen (Duke of Franconia), and Welf, uncle of Henry the Lion, Duke of Saxony, rallied their followers by the respective warcries, 'Hie Waiblingen!' 'Hie Welf!' As the chief theatre of the conflict of these parties was Italy, the original names took the Italian form of *Guelfi* and *Ghibellini*. The Ghibellini may, in general, be described as supporters of the imperial authority in Italy; the Guelfi, as opponents of the emperors; and as the opposition to imperial authority in Italy combined two distinct parties in a common cause—the church, which asserted its own spiritual independence, and the minor principalities and free cities, which maintained their provincial or municipal rights and liberties—the history of the struggle is involved in confusion, and is variously related, and its merits variously appreciated, from differing points of view. To the churchman, it is the struggle of the church against the state; to the friend of popular principles, it is the conflict of liberty against absolutism and centralization. The same individual—e.g., the poet Dante—is found changing sides in the struggle. For the most part, however, the interest of the church in these mediæval contests, though regarded by Protestants as excessive in degree, must be classed as falling in with the claims of political and personal freedom. Five great crises in the strife of the Guelfs and Ghibellines are noted by historians: under Henry IV., 1055; under Henry the Proud, 1127; under Henry the Lion, 1140; under Frederick Barbarossa, 1159, and in the pontificate of the great champion of churchmanship, Innocent III. The cities of northern Italy were divided between the two parties—Florence, Bologna, Milan, and other cities, as a general rule, taking the side of the Guelphs; while Pisa, Verona, and Arezzo, were Ghibelline. The great Italian families, in like manner, took opposite sides; but the policy of each family frequently varied from one generation to another. In general, it may be said that the nobles of the more northern provinces of Italy inclined to the Ghibelline side, while those of the central and southern provinces were Guelph. By degrees, however, especially after the downfall of the preponderance of the German emperors in Italy, the contest ceased to be a strife of principles, and degenerated into a mere struggle of rival factions, availing themselves of the prestige of ancient names and traditional or hereditary prejudices. Even in 1272, Gregory X. could with truth reproach the Italians with their sanguinary animosities for the sake of what were but names, the meaning of which few of

them could understand or explain; and, in the following century, in 1334, Benedict XII. practically disallows altogether the reality of the grounds of division between the parties, by prescribing, under pain of the censures of the church, the further use of those once-stirring names, which had long been the rallying words of a sanguinary warfare. From the 14th c. we read little more of Guelphs or Ghibellines, as actually existing parties; but in the sense already explained, the conflict of principles which they represent is found in every period of political history.

GUEL'DERLAND. See GELDERLAND.

GUELDER-ROSE, n. *gĕl'dĕr-rōz,* or GUELDRES ROSE [from *Gelderland,* in Holland; L. *rosa,* a rose]: cultivated variety of the Water-Elder (*Viburnum Opulus*—see VIBURNUM), in which the flowers are all barren, and instead of forming flat cymes, as in the wild plant, form much larger globose corymbs. It is sometimes called the SNOW BALL TREE, also Marsh Elder. It bears juicy red berries, which though sometimes eaten in n. Europe, have emetic, purgative, and narcotic properties verging on the poisonous. When abounding in flowers, it is a very ornamental shrub, and is often planted.

GUELPH, *gwĕlf,* Canada, city and county-seat of Wellington County, Ontario; on the river Speed, and on the Grand T. and Canadian P. Rys., 48 miles west of Toronto; founded by John Galt (q.v.). The river affords abundant water power and the city, in a rich agricultural and cattle-raising district, enjoys a large trade. It is an inland port of entry and is the seat of a United States consulate. It has breweries, large flour, saw, and planing-mills, and manufactories of foundry products, machinery, pipe and tubing, musical instruments, sewing-machines, agricultural implements, woolen goods, carpets, furniture, carriages, leather, soap, boots and shoes, etc. Good building stone is quarried in the vicinity. Guelph has in addition to the county buildings, 4 colleges, 16 churches, substantial business blocks, banks, a library and reading-room, and daily and weekly newspapers. The city owns and operates its electric light, gas and power, its water-works and street railway. It is the seat of the Ontario Agricultural College and the Provincial Experimental Farm. Pop. 12,500.

GUELPHIC OR'DER, *gwĕlf'ĭk:* order of knighthood for Hanover, instituted 1815, Aug. 12, by George IV., when prince regent. It is both a military and civil order, unlimited in number; and consisted originally of three classes—Knights Grand Cross, Commanders, and Knights—to which the revised statutes of 1841 have added another class of simple members. The Grand Mastership is vested in the crown of Hanover. The badge of the order is a gold cross, surmounted by the

Hanoverian crown—between each division of the cross is a lion passant gardant. In the centre is the horse courant of Hanover, surrounded by a blue circle, and the motto, *Nec aspera terrent.*

GUELPHS. See GUELFS AND GHIBELLINES.

GUERCINO, *gwĕr-chē'no* ('squint-eyed'), properly GIAN FRANCESCO BARBIERI: celebrated master in the Bolognese school of painting: 1590–1666; b. Cento, a pretty town not far from Bologna. Guercino early showed artistic gift by sketching with the roughest materials on the house-door a Virgin so full of artistic promise, that his father, in spite of straitened circumstances, immediately secured for him the best tuition in drawing which the place afforded. In 1616 Guercino opened an academy at Cento, to which pupils flocked from all quarters. 1619–23 he visited different cities of Italy, particularly Rome and Venice, to study works of eminent painters. In 1642 he went to live at Bologna, where he died. Some of the early paintings of Guercino show his admiration of Caravaggio's style, both in their powerful effects of deep coloring and strong fidelity to nature, while they much surpass those of the great realist in dignity and refinement of tone. They are deficient, however, in accuracy of design. His works, which are very numerous, are in the galleries of Rome, Bologna, Parma, Modena, Perugia, and Paris. His masterpieces are considered to be the fresco of *Aurora,* which decorates the ceiling of one of the casinos of the Roman villa Ludovisi; the famous *Persian Sibyl,* and *Saint Petronilla,* both in the Capitoline Gallery at Rome. At Cento, the artist's house, *Casa di Guercino,* is carefully preserved, with its fine paintings and fresco decorations, and is the chief object of interest to those who visit the place. The church of Cento, also contains several fine works of this master, who had an intense love for his birth-place.

GUERDON, n. *gĕr'dŏn* [OF. *guerdon;* It. *guiderdone,* a reward—from mid. L. *wīdĕrdōnŭm*—from O.H.G. *wider,* against, back again; L. *dōnŭm,* a gift]: reward, recompense: V. to reward. GUER'DONING, imp. GUER'DONED, pp. *-dŏnd.* GUER'DONABLE, a. *-ă-bl,* worthy of reward.

GUERICKE, *gĕr'ĭk-kĕh* or *gā'rĭk-kĕh,* OTTO VON: 1602, Nov. 20—1686, May 11; b. Magdeburg, Prussian Saxony: physicist. He is known chiefly by his discoveries regarding the nature and effects of air. The experiments of Galileo and Pascal on the weight of air led Guericke to attempt the creation of a vacuum. His first experiment was made by filling a stout barrel with water, and then pumping out the water; but it was found that no sooner was a vacuum produced in the barrel than the air forced its way through. He now took a globe of copper, with an opening at the bottom into which a pump was fitted, provided with a stopcock, and to his aston-

ishment found that the pump extracted the air quite as well as the water; then, on opening the cock, the air was heard rushing in with a whistling noise. This, the first air-pump, was invented about 1650. Guericke's invention soon became famous, and in 1654 he was summoned to the presence of Emperor Ferdinand III. of Germany at Ratisbon, at which time he made the famous experiment commonly known as the Magdeburg Hemispheres (q.v.). He died at Hamburg.

GUERILLA, n. *gėr-ĭl'lă* or *gwėr-ĭl'lă* [Sp. *guerrilla*, a war of partisans—dim. of *guerra*, war]: one of an irregular force employed in small bands to harass an army, particularly in a mountainous country. ADJ. pert. to irregular warfare; carried on by independent bands. The term guerillas was applied first in Spain to armed bands of peasants and shepherds, carrying on an irregular warfare on their own account. They were regularly organized (1808–14) against the French, and being favored by the character of the country, were often successful, especially at the commencement of the war, under Empecinado, the Pastor Merino, Mina, and other leaders. The country itself suffered from the guerillas, who revenged political treachery, or even the bare suspicion of it, by fearful devastations. Many of them, particularly Mina's band, joined Wellington's force, and after a course of discipline, rendered good service as regular troops. In all the recent civil wars of Spain, the guerillas, especially of the Basque provinces, were prominent on the Carlist side.

GUÉRIN, *gā-răng'*, GEORGES MAURICE, DE: 1810, Aug. 4—1839, July 19; b. Languedoc, France: poet. He was educated in a seminary at Toulouse and Stanislas College, Paris, and then entered the religious soc. at La Chesnaye in Brittany preparatory to an ecclesiastical career. Here he gave more thought to poetry than theology, and though Bp. Lamennais induced him to join a new religious order 1833, Aug., his doubts as to his vocation became so strong that within two months he renounced his novitiate. In 1834 he went to Paris, and after working some time on the newspaper and magazine press, became a teacher in Stanislas College. His poems show rare power and large original talent, and were published in 2 vols. 1860.—His sister, EUGÉNIE DE G., 1805–1848, May 31, was a woman of devout religious life and superior education, who seemed to live only to care for her brother. Her *Journals* (1861, English tr. 1865) and *Lettres* (1864, English tr. 1865) are written in charming style, and show rare genius and religious fervor.

GUÉRIN, *gā-răng'*, PIERRE NARCISSE, Baron: 1774, May 13—1833, July 16; b. Paris: eminent historical painter of the French classic school. He attracted notice first by his *Corps de Brutus rapporté à Rome* (1796). Some of his works are master-pieces of the French classic

school. The few portraits executed by Guerin are admirable. Among others may be mentioned one of Henri de la Roche-Jacquelin storming an intrenchment. In 1829 he was raised to the rank of baron. He died at Rome. Purity of design, dignity of style, taste in grouping, and harmony of color are generally conceded to Guerin, but the boldness which marks the classic schools of painters is as visible in him as in others.

GUERNSEY, *gėrn'zĭ:* second in size of the Channel Islands (q.v.); lat. 49° 24′—49° 30′ n., and long. 2° 33′—2° 41′ w.; 69 m. s.e. from Start Point, in the s. of Devonshire—nearest point of the English coast; about 46 m. s.w. from Cherbourg, France. Its length is 9 m., greatest breadth about 6 m., circumference 31 m. The coast is difficult of approach, owing to the number of rocks and the rapidity of currents. The n. part of the island is flat, the s. more elevated, but intersected by deep valleys and glens, and with a lofty and abrupt coast. St. Peter's, or St. Peter Port, on the s.e. coast is the only important town; pop. about 17,000. The Island is populous and wealthy, has many strong defensive works. For particulars about climate, soil, productions, trade, etc., see JERSEY. Pop. with Herm and Jethou (1901) 40,777.

GUERRAZZI, *gwĕr-rât'sē,* FRANCESCO DOMENICO: 1804, Aug. 12—1873, Sep. 25; b. Leghorn: Italian statesman and writer. He was educated for the legal profession, won reputation among his countrymen by his political fictions, said to have had immense influence on contemporary Italian events by their patriotic enthusiasm and abhorrence of despotism. Guerrazzi's own words are, 'he wrote a book when impotent to fight a battle.' On the eve of the definite breach between the people and the Grand Duke of Tuscany 1849 Guerrazzi was induced to accept office in the ministry. On the flight of the grand duke, he was proclaimed member of the provisional government, and subsequently dictator. During this crisis of the state he energetically refused his adhesion to 'the substitution of republicanism for monarchy;' and preserved the strict autonomy of Tuscany until the return of the grand ducal rule, when he was immediately seized and imprisoned on the grounds of having neglected due measures of repression when the revolution first gathered strength during his ministry. His defense entitled *Apologia della vita Politica di F. D. Guerrazzi,* or 'Justification of the Political Career of F. D. Guerrazzi,' is a master-piece. After an imprisonment of three years, he was condemned for life to the galleys, but was subsequently permitted to select Corsica as the place of his perpetual banishment. Restored to liberty and action by later events, Guerrazzi sat in the parliament of Turin 1862 and 65.—His chief works of fiction are *L'Assedio di Firenze* (The Siege of Florence), a magnificent historical novel, treating of the downfall of

the republic of Florence; *La Battaglia di Benevento*, remarkable for exquisite expression and beautiful poetic imagery; *Beatrice Cenci; Isabella Orsini; L'Asino;* and various other writings, which have run through innumerable editions and translations.

GUERRERO, Mexico, a state bounded by the states of Morelos and Mexico on the north, Puebla on the northeast, Oajaca on the east and southeast, and by the Pacific Ocean on the southwest. Its area is given as 64,756 square kilometres, or 24,926 square miles. It is mountainous throughout almost its entire extent, the northern section being occupied by the spurs of the ranges of Morelos and Mexico, and the southern by the Sierra Madre del Sur (highest peaks 2,800 metres). Between these two sections runs the Mexcala or Balsas River, to which all the streams of the state are tributary. The principal lakes are Pazahualco, Chantengo, San Marcos, and Nexpa. The Pacific coast line is low and sandy, and has excellent harbors. The bay of Acapulco, the chief port, is deep and spacious. The mineral resources of the state have been as yet very imperfectly developed. Gold, silver, lead, mercury, iron, coal, sulphur, marble, granite, opals, topazes, and diamonds are mentioned among its products. The climate is unhealthy. On the coast the heat (from 95° to 96.80° F.) and rainfall are both excessive; and in the belt above 6,500 feet, the cold is sometimes severe. Fevers, leprosy, and affections of the respiratory and digestive organs are the prevailing diseases. The annual value of the agricultural products is about $2,200,000, and the total value of live stock is estimated at $3,000,000. Manufactures are limited to sugar-cane products, mescal wine, palm-oil, cotton fabrics, and leather. Plans for a number of railways have been made, but have not been carried out. There are, however, telegraph and telephone lines, and a few wagon roads. Steamers of the Pacific Mail and the Mexican International Company touch at Acapulco. The state is divided into 14 districts: La Unión, Mina, Alarcón, Hidalgo, Alvarez, Zaragoza, Morelos, Abasolo, Allende, Tabares (chief town Acapulco de Juarez, with population of 5,780), Galeana, Chilpancingo (principal town and capital of the state Chilpancingo de los Bravos, with population of 6,321), and Guerrero. Total population of the state 420,336.

GUERRE'RO, Vicente, President of Mexico: 1783—1831, Feb. 14; b. Tixtla. He was born a slave of mixed negro and Spanish blood, was active in the insurrection 1809, a leader in the battle of Izucar 1812, Feb. 23, gained several victories over the Spaniards in the s. of Mexico, continued to resist the Spaniards after the death or imprisonment of all the other native leaders till his great victory of Tamo 1818, Sep. 15, then joined Iturbide in a movement for national independence. After Iturbide was proclaimed emperor, Guerrero opposed him

and was defeated in the battle of Almolonga 1823, Jan. 23, but on the return of the republicans to power he became a member of the executive council that exiled the emperor. In 1827 he was defeated as the candidate of the liberal party for pres., but at the close of the civil war that followed he was declared pres. as a compromise 1829. On the return of the Spanish troops he was proclaimed dictator and defeated the invaders. He resigned 1830, went s., made an unsuccessful attempt at revolution, was captured, and shot at Cailapa.

GUESCLIN, *gā-klăng'*, BERTRAND DU, Count of Longueville, Constable of France: most eminent French general of the 14th c.: b. of an ancient family in the dist. of Rennes, between 1314 and 20; d. 1380, July 3. As a boy, he was remarkably dull, and could not be taught either to read or write, but had a passion for military exercises. In his 17th year he bore away the prize at a tournament at Rennes, and from that time was always successful in such encounters. In the contests between Charles de Blois and Jean de Monfort for the dukedom of Brittany, he took part with the former. After King John had been taken prisoner by the Black Prince at the battle of Poitiers 1356, Guesclin rendered important services to the Dauphin, afterward Charles V. He took Melun and several other fortified towns, freed the Seine from the English, and on Charles's accession to the throne 1364, was created gov. of Pontorson. In May of the same year he gained the battle of Cocherel, and was rewarded by the title Count of Longueville and Marshal of Normandy. On Sep. 29 he was defeated and taken prisoner by the English, under Sir John Chandos, at the battle of Auray, but liberated on payment of a ransom of 100,000 livres, paid by the king, the pope, and several other princes. He now supported Henry, Count of Trastamare, against Pedro the Cruel, King of Castile, but was defeated and taken prisoner by the Black Prince. Being again ransomed on payment of a large sum, to which even the enemy contributed from feelings of respect, Guesclin renewed the contest, and 1369 defeated and slew Pedro, and placed the crown of Castile on the head of Henry of Trastamare. As an acknowledgment of his services, Henry created Guesclin Count of Burgos, Duke of Molina, and Constable of Castile. He was, however, soon recalled by Charles V. of France, at that time hard pressed by the English, and raised by that monarch to the dignity of Constable of France. In 1370, Guesclin opened his campaign against the English, and in a short the whole of their possessions were in the hands of the French, with the exception of a few fortified towns. While assisting his friend Sancerre in the siege of Châteauneuf de Randon, in Languedoc, Guesclin was taken ill, and died. Charles V. caused him to be interred with great pomp beside his own burial vault at St. Denys.—Compare Guyard de Berville, *Historie de Bertrand du Guesclin* (Paris 1767).

GUESS, n. *gĕs* [Dut. *ghissen*, to estimate, to guess: Icel. *giska;* Norw. *gissa;* Dan. *gisse*, to guess: comp. Gael. *gis*, to conjecture]: a conjecture; an opinion formed without certain knowledge: V. to conjecture; to suppose; to form an opinion without sufficient evidence; to decide from mere probabilities; to hit upon the truth. GUES'SING, imp.: N. the forming of conjectures. GUESSED, pp. *gĕst.* GUES'SER, n. *sĕr*, one who. GUES'SINGLY, ad. *-lĭ* GUESS-WORK, n. random or haphazard conjecture.—SYN. of 'guess, n.': supposition, hypothesis, surmise, suspicion; thought; fancy; imagination; divination.

GUEST, n. *gĕst* [Goth. *gasts*, a stranger: Ger. *gast;* Icel. *gestr*, a guest: W. *gwest*, a visit; *gwestai* a visitor]: a stranger or friend entertained in the house of another; a visitor. GUEST-CHAMBER, the public room of the house; the apartment appropriated to guests. GUEST-WISE, in the manner of a guest.

GUEUX, *gŭh*, or 'THE BEGGARS': name assumed by the confederated nobles and others who opposed the tyrannical policy of Philip II. of Spain in the Low Countries. Philip having sent nine inquisitors to that country to put into execution the decrees of the Council of Trent, provoked by this act the bitter resentment of the Protestants, as well as of many Rom. Cath. citizens and nobility, who saw in it an attempt to curtail their ancient liberties. A party of opposition was thus formed, and, headed by Counts Louis of Nassau and Henry de Brederode, declared in an act called the 'Compromise,' remitted (1566, Apr. 5) to the Regent Margaret, their fixed determination to ignore utterly the authority of the inquisitors. On the admission of a deputation from them to an audience, the regent seemed somewhat unnerved by their bold front, and inclined to yield to their demands; when one of her council approached her, and whispered that she 'need not be afraid of these gatherings of beggars.' The remark having been overheard by some of the deputation, the abusive epithet was assumed as the title of their association. As a sign of fraternity, each of the 'beggars' wore a medal called the 'beggar's denier,' made of gold or silver, and stamped on the obverse with the image of Philip II. and the inscription, 'In everything faithful to the king;' and on the reverse with a wallet, such as the mendicant monks carried, held in two hands, with the words, 'even to the carrying of the wallet.' The 'beggars' maintained a long and vigorous contest against the despotic proceedings of Philip and his advisers, but were ultimately compelled to succumb to superior force. A branch of them, 'the Beggars of the Sea,' under the bold leadership of the savage Count de la Marck, were almost uniformly successful in their enterprises: they several times defeated the Spanish fleet, captured transports with supplies for Alva's army, captured several fortresses, and succored besieged places along the coast.

GUFFAW, n. *gŭf-faw'* [Scot. *guffa*, or *gu fà;* Gael *gu fad*, lengthily, with length]: a long boisterous laugh; a loud burst of laughter.

GUFFER, n. *gŭf'fėr:* one of the names for the viviparous blenny; other common names are 'eel-pout, tanglake and greenbone.'

GUGGENBŬHL, *gôg'gėn-bühl*, LOUIS, M.D.: 1816–1863, Feb. 2; b. Zurich, Switzerland: philanthropist. He graduated in medicine 1836, spent three years studying the epidemic idiocy that has long prevailed in the deep Alpine valleys of Italy and Switzerland as well as in the Pyrenees and Himalayas, bought a mountain (Abendberg) near Interlaken 1841, and in the following year opened a retreat for this particular class of idiots (cretins), which became the model for many similar institutions elsewhere.

GUGLIELMI, *gôl-yĕl'mē*, PIETRO: 1727, May—1804, Nov. 19; b. Massa di Carrara: musician and composer. From his father, *Maestro di Cappella*, in the ducal chapel of Modena, he acquired the elements of music. His first opera, composed at the age of 28, was performed at Turin and was greeted with enthusiasm. After a residence of some months at Dresden, Vienna, and various other towns, Guglielmi passed over to London, where he remained five years, assiduously engaged in composition. At the age of 50 he returned to Naples with the double prestige of great fame and wealth. In 1793, Pope Pius VI. appointed him *Maestro di Cappella* at St. Peter's, and from that time his official duties seem completely to have engrossed him. He died at Rome. The characteristics of his style are pre-eminently simplicity, purity, and precision, and these qualities he inexorably demanded from the exponents of his inspiration—'Sing *my* music and not *yours!*' His best known operas are—*La Clemenza di Tito; Artaserse; La Didone; Enea e Lavinia; La Morte di Oloferne; Debora e Sisera;* and the comic operas *La Virtuosa di Mergellina; I due Gemelle; La Serva Innamorata; La Pastorella Nobile; La Bella Pescatrice.*

GUIANA *ge-â'nâ*, the name applied to all that tract of country in South America bounded by the Atlantic Ocean, the Amazon River and its branches, and the Orinoco River and its branches. It lies between lat. 8° 40′ n. and lat. 3° 30′ s., between long. 50° and 60° w. Its greatest extent east and west is 1,090 miles; its greatest breadth, from Punta Barima, to the confluence of Rio Negro with the Amazon, is 710 miles. The total area is more than 800,000 square miles. The western districts belong to Venezuela; the southern and eastern districts to Brazil. The three European colonies, the British, Dutch, and French Guianas, extend from the seacoast to the frontiers of those republics. The first settlements on the northern coast lay much farther toward the west, and exploration and colonization east

of the Orinoco began when European adventurers continued in this new field their search for Eldorado. Spanish and Portuguese expeditions into Guiana during the 16th century were very numerous, but always disastrous. The English undertook its conquest, believing, in the words of Sir Walter Raleigh, 'that whatever prince shall possess it, that prince shall be lord of more gold, and of a more beautiful empire, and of more cities and people, than either the king of Spain or the great Turk.' Capt. Laurens Keymis, sent by Raleigh in 1596 to explore the region, reported that 'the like occasion seldom happeneth in many ages.' Dutch traders, who arrived about 1580, settled on the Pomeroon and Essequibo rivers; and after the establishment of the Dutch West India Company land on the Berbice River was granted to van Peere. The Pomeroon colony was abandoned owing to attacks by the English in 1666 and by French privateers. In 1740 English planters from the West Indies established themselves on the Essequibo, as a result of the 'open door' policy adopted by the Dutch with respect to that region alone. Next, the overflow of immigration settled in the Demerara district; and in 1781 all three colonies, Essequibo, Demerara, and Berbice, were taken by the British. Recaptured before the year was out by the French (who were then allies of the Netherlands), they were again taken by the British in 1796. The peace of Amiens restored the original status; but English troops interposed once more, and the colonies were ceded to Great Britain by the treaties of 1814–15. They were united in 1831, forming British Guiana.

In the region east of Berbice, a few English people attempted to form a colony at the village of Paramaribo (1626), but abandoned the project. Ten years afterward the French invested Paramaribo, but relinquished it, proceeded to Cayenne, and there founded what is now known as French Guiana. In 1652 a body of English settlers again arrived at the Coma River, and succeeded in establishing themselves. This colony was granted in 1662 by Charles II. to Lord Willoughby, who changed the name Coma River into Surryham, in honor of the Earl of Surrey. Hence we have 'Surinam,' the name often used instead of Dutch Guiana. The British crown bought the colony from the heirs of Lord Willoughby, but it passed into the hands of the Dutch about the time when Holland gave up the attempt to keep New Amsterdam, now New York. The statement often repeated, that Surinam was 'exchanged' for New Amsterdam is incorrect.

1. British Guiana is situated approximately between lat. 1° and 8° 40′ N. It is bounded on the north and northeast by the Atlantic Ocean, on the east by Dutch Guiana, on the south by Brazil, and on the west by Brazil and Venezuela. Its area is 104,000 square miles.

The old settlements of Essequibo, Berbice, and Demerara form counties with the same names. Of these, Demerara contains the capital of the colony (see GEORGETOWN); Essequibo, the town of Bartica, the point of departure for miners going to the gold-fields; and the capital of Berbice County is New Amsterdam. One of the chief points on the new boundary line with Venezuela, Mount Roraima, is an immense sandstone mass rising with perpendicular sides 2,000 feet above the slopes (themselves 6,000 feet above sea-level) which form its base. Some of the neighboring mountains resemble it in form, but are less imposing. Midway between this group and the Atlantic coast is the Imataca range, extending east-southeast to the confluence of the Cuyuni and Essequibo. The latter with its tributaries drains nearly the whole interior of the colony; the Demerara, though much smaller, is more important, because it flows through the region which has become the centre of population; the Corentyne is the boundary between British and Dutch Guiana.

Geology and Mineral Resources.—The original sea beach is found far inland, where it now appears as long stretches of white sand reefs, the sand being derived from a barrier of primary, volcanic and metamorphic rocks, which impedes the navigation of the rivers. The strip between this barrier and the ocean front—composed of layers of soft mud, clay, sand, broken shells, and decomposed vegetable matter—is really an enormous mud-flat, about 100 feet in depth, and covered with a rich, heavy loam, and in places, with a kind of peat called pegass. The whole interior of the country, between the agricultural coast-strip and the range culminating in Roraima, is an auriferous region. The gold is commonly found in combination with silver. Quartz-mines have been worked in upper Demerara, but placer-mines in the beds of former streams or the channels of existing ones are more usual. Other mineral products are iron, sapphires, diamonds, mercury, garnets, antimony, and plumbago. A sandstone formation characterizes the southwest, from Mount Roraima to the Potaro and Essequibo rivers, thence extending eastward across the Demerara, Berbice, and Corentyne. The sandstone is interbedded with volcanic rocks. In many parts of the colony there are red, yellow, and blue clays; and fine white clay, suitable for the manufacture of porcelain, is also found.

Soil and Climate.—The surface of the coast alluvium is so fertile that alternation of crops is not required; it is, however, very heavy and hard to cultivate. The thermometer ranges generally from 76° to 86° F., with little difference in this respect between day and night. Rainfall in some years 130 inches, in others not more than 70 inches. The year is divided into two rainy seasons (November–February and May–July), and two dry

seasons. Neither destructive earthquakes nor hurricanes occur. There has been only one serious outbreak of yellow fever during 50 years. Death rate of the colony about 35 per 1,000.

Flora and Fauna.—Characteristic forest products are exceedingly hard and heavy woods. The greenheart, mora, and wallaba are valuable for building; the simaruba, letter-wood, and crabwood, for making furniture, etc. Vegetation in Guiana is remarkable on account of the altitude of the trees and the great size of leaves and flowers. The gigantic water-lily, Victoria Regia, is very common. Some of the orchids form large masses, with flower-stems 12 feet high. Common mammals are sloths, deer, ant-eaters, tapirs, armadillos, peccaries, jaguars, cavies, and ring-tail monkeys. Monkeys belong to two families which are entirely confined to this region, and bats develop here their most extraordinary specializations. In some parts of the forest vampires are 'ready to suck the foot or even the cheek of the unwary traveler.' The manatee (*vulgo* 'mermaid' or 'water-mamma'), inhabiting some of the large rivers, and coming to the surface at intervals to breathe or to graze on the plants which line the banks, owes its popular designations to the circumstance that it suckles its young at the breast. The representative families of birds are, with few exceptions, peculiar to this region, the list of such birds including greenlets, tanagers, hang-nests, sugar-birds, tree-creepers, manakins, and cotingas. Alligators and boa constrictors both attain to great size in this region; iguanas and smaller kinds of lizards are numerous. Among the insects, the variety of genera and species can, it is thought, scarcely be equaled in any other part of the world. Uncommon brilliance of coloring is characteristic of both the birds and the insects.

Agriculture.—About 80,000 acres are under cultivation, or, say, one acre out of every 100 available for the purpose; and of this amount 71,766 acres are in sugar plantations. Only a very small portion is devoted to coffee and cocoa.

Commerce, Shipping, Railways, etc.—The chief imports in 1901–2 were tissues, flour, machinery, manures, rice, fish, hardware, coal, and tobacco, cigars, and cigarettes. The total value of imports (principally from Great Britain and British possessions) was $7,073,845. The chief exports in the same year, with their values: Sugar, $5,190,815; gold, $1,857,460; rum, $804,230; balatta, $118,265; timber and woods, $105,605; diamonds, $95,275; charcoal, $35,930; and molasses, $24,015. The total value of exports was $9,168,120.

Money and Banking.—British gold and silver are used. There are 25 savings banks, with 21,266 depositors, and 2 banks with note circulation.

Government.—The governor is assisted in executive

and administrative matters by an advisory council, composed of 3 colonists and 3 officials, all appointed by the king of England; in legislative matters by the Court of Policy (7 officials beside the governor, and 8 elective members, chosen from inhabitants by constituency of 2,676 voters qualified by income or property). The governor has a casting vote, and can decide any question against the votes of the representative members. The colonists are in the majority, however, in the Combined Court, which votes the taxes and public expenditures.

Finances.—Total revenue for the year 1901–2 was $2,657,535, derived mainly from customs, licenses, duty on rum, and royalty on gold. Public expenditures in the same year amounted to $2,613,155. The public debt in 1901 was $4,960,600.

Population, Schools and Judiciary.—The census of 1891 showed: Negroes, 115,588; East Indians (Hindu coolies), 105,465; aboriginal Indians, about 17,463; Portuguese from Madeira, 12,166; whites of other nationalities, 4,558; Chinese, 3,433; mixed races, etc., 29,376. The total number of inhabitants was therefore 288,049. In 1901–2 the schools, numbering 213, had 26,684 pupils. There are three judges, and, in the several districts, a number of magistrates. The criminal law is based on that of England; in civil cases the Roman-Dutch law is applied with certain modifications.

History (including the boundary dispute with Venezuela).—Prohibition of the slave trade checked the agricultural development of the colony, and emancipation of the slaves (1838) ruined many planters, the freed negroes demanding higher wages than the planters could afford to pay. This crisis led to the introduction of large numbers of laborers from Madeira, the East Indies, China, and Malta. Immigrants of a different class began to arrive about 1886 in consequence of the rediscovery of gold; but serious difficulties arose precisely on account of the enhancement in the value of the auriferous regions, some of the most promising of which were located in the territory west of the Essequibo claimed by both Venezuela and Great Britain. The inland limits of the Spanish (afterward Venezuelan), the British, the Dutch, the French, and the Portuguese (afterward Brazilian) Guianas were undetermined. In 1841 Schomburgk surveyed the boundary line of British Guiana for the British government, and made two maps; the second or revised map placing the boundary with Venezuela much farther toward the west than the first. Subsequently Venezuela and Great Britain agreed not to encroach upon the territory in dispute, pending a settlement of the boundary question, but both countries offended against the spirit of this compact. The proposal for arbitration in 1887 was met by England's prompt refusal to admit any

doubt as to her title to the lands east of the revised Schomburgk line, and, a little later, by the establishment of British posts, and the declaration that the region drained by the Barima River was hers by right. It is necessary to bear in mind that if England had accepted the views of Venezuela and Brazil as to the boundaries of British Guiana, that colony would have disappeared from the map. Brazil claimed all but about 12,000 square miles; Venezuela nearly the whole of the old Essequibo colony, the Pomeroon and the unsettled interior districts. When President Cleveland, in 1895, called to the attention of the British government the bearing of the Monroe doctrine upon the question at issue, his suggestion was at first not accepted. His message to Congress went much farther. It advised Congress that a commission should be appointed for the determination of the true boundary, and declared in effect that any attempt to extend British territory beyond the true boundary should be resisted by the United States, by force if necessary. It was a threat of war. Pursuant to the act of Congress 1895, Dec. 21, a commission was appointed 1896, Jan. 1. But before their report was submitted a treaty providing for the reference of the matter to a tribunal of arbitration had been signed at Washington 1897, Feb. 2. Arbitrators were: Chief Justice Fuller and Justice Brewer of United States Supreme Court; Lord Herschell (and, after his death, Lord Russell of Killowen), and Justice Sir R. H. Collins; and as president, Prof. Martens. The tribunal met at Paris in 1899. The award, given October 3 determined the boundary nearly in correspondence with the second or revised Schomburgk line, assigning to Great Britain a region about 60,000 square miles in area which Venezuela had claimed. On the other hand, Point Barima, at the principal mouth of the Orinoco, and certain gold-fields near the headwaters of the Cuyuni, were awarded to Venezuela. The territory of British Guiana, thus defined, extends along the seacoast to Point Playa, and includes the whole valley of the Barima and that of the Cuyuni east of the Wenamu—the larger part, though not the best part, of the mining region.

2. Dutch Guiana or Surinam is bounded on the north by the Atlantic Ocean, on the east by French Guiana, on the south by Brazil, and on the west by British Guiana. It extends from lat. 2° to 6° n., and from long. 53° 50′ to 58° 20′ e. Area 46,060 square miles. The political divisions are districts, 16 in number, and communes; the capital, Paramaribo, has about 31,817 inhabitants. Chief products are: Cacao (75 plantations), sugar (7 plantations), coffee, bananas, rice, maize, rum, molasses, and gold (output valued at about $480,000 in 1900). The mining experience of this colony resembles that of British Guiana: the metal has

been sought hitherto in beds of streams, etc., but is now being taken also from mines which require crushing machinery. Imports regularly exceed in value the exports; thus in 1901 imports amounted to $2,831,112, and exports to $2,146,224. During the years 1897 to 1901 the value of exports remained almost stationary, while that of imports steadily increased. Executive authority is vested in a governor. The representative assembly, called the Colonial States, is composed of members chosen for 6 years by a limited number of electors. The council consists of 5 members, including the governor himself as president, and represents the sovereign. The revenues of the colony fall short of the expenditures. The military force is about as follows: Garrison, 20 officers and 351 men; militia, 27 officers and 411 men; and civic guard, 59 officers and 1,061 men. There are a few guard ships and vessels of the royal navy. The number of inhabitants in 1902 was somewhat more than 69,000. Educational institutions are: A normal school; schools maintained by the Moravian Brethren and the Roman Catholics; 33 private schools, with 4,822 pupils; and 20 public schools, with 2,342 pupils. The judicial system comprises a court of justice (all the officers appointed by the queen), two circuit, and three district courts. Slavery was abolished 1863, July 1, but the authorities imposed the conditions that for 10 years the emancipated negroes should remain upon the plantations of the districts in which they had formerly lived, and should perform the same kind of work for wages that they had been accustomed to while in bondage. After 1873, July 1, the importation of laborers to replace the freedmen became a matter of life and death in Surinam as in the neighboring colonies, for agriculture was almost ruined.

3. French Guiana, lying between the Atlantic Ocean, Brazil, and Dutch Guiana, has an area of about 30,500 square miles. Besides Cayenne, capital of the colony, and its only port (population, according to the latest census, 12,612), there are 13 communes. Mineral productions are gold, silver, marble, phosphates, and iron. In 1901 the exports of gold amounted to 94,147 ounces. Agricultural productions are varied (including sugar-cane, cocoa, coffee, rice, indigo, tobacco, maise, and manioc), but laborers are few, the area under cultivation is small, and the total value of the crops insignificant. Here, as in Dutch Guiana, the value of exports is much less than that of the imports, the difference in 1901 being about $689,750. Colonial interests are entrusted to a governor and privy council of 7 members, and one deputy represents the colony in the French Parliament. There is also an assembly called the Council-General, composed of 16 members. Revenue and expenditures for 1902 were

each estimated at $657,261; but the cost of maintaining the penal establishment ($1,139,122, according to the budget of 1903), is borne by the French republic. Between 300 and 400 French soldiers are kept in the colony. The total population, including convicts and Indians, was given as 32,908 in 1901. Cayenne has a superior court, court of first instance, and two justices of the peace; a college, a library, and a museum; in the entire colony there are 27 primary schools.

From the first, the French undertaking in Guiana has been unsuccessful. In 1653, Dec. 11, the survivors of the original colony abandoned the fort and sailed away, after suffering from hunger and disease. A new company formed for the colonization of Cayenne in 1663 was scarcely able to hold its own against hostile neighbors in Brazil. The deportation of political prisoners to Guiana at the end of the 18th century completed the ruin which Portuguese attacks had begun; for the exiles ascribed the death of their companions to the climate; and French Guiana was completely discredited in the eyes of the world. In 1809, January, the colony surrendered to the Portuguese and English. It was restored to France by the treaties of 1814–15. Since 1855 it has been used as a penal settlement. In 1902 the number of convicts in residence there was 10,075, including 240 women. The boundaries with Brazil were determined 1900, Dec. 1, by the Swiss court of arbitration.

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GUICCIARDINI, *gwēt-chār-dē'nē,* Francesco: 1483-1540; b. Florence; of noble parentage: Italian statesman and historian. He early studied law and literature, and before the age of 23, he was elected prof. of law by the Signoria of Florence, and had a reputation for great skill as a legal practitioner. Guicciardini was ambitious, and his knowledge of international law, and tact in the conduct of public affairs, caused him to be selected 1512, by the Signoria, as ambassador to the court of Ferdinand, King of Aragon. Returning to Florence after two years, he was received with every mark of public approval, and 1525 was despatched by the republic to receive at Cortona Pope Leo X. This sharp-sighted pontiff at once secured Guicciardini's services, and committed to him the government of Modena and Reggio, and finally of Parma. Clement VII. continued to shower dignities on Guicciardini, and appointed him, with unlimited powers, gov. of the Romagna, and finally of Bologna. On the accession of Paul III., Guicciar-

dini resigned all his dignities, and after 18 years of papal service, returned to Florence, where Alexander de' Medici had just been thrust on the citizens as their sovereign by Charles V. On the assassination of Alexander, Guicciardini promoted materially the elevation of Cosmo de' Medici, but meeting with no special favor from that prince, he withdrew from Florence to his villa at Arcetri, where he commenced his famous work, *La Storia d'Italia.* He died before its completion. 21 years after his death, the first 16 books of his history were published, and three years later, four additional books appeared. The work is considered a standard of classical historical writing, independent of its value as a minute and faithful record of the period it embraces, 1490–1534. A magnificent Italian edition was published at Freyburg 1775–6, four vols. 4to, strictly in accordance with the manuscripts deposited in the Magliabecchi library at Florence; another was published at Pisa, 1819, 10 vols. 8vo, edited by Rosini. 1857–67, appeared at Florence *Opere inedite di Francesco Guicciardini,* comprising a series of aphorisms and discourses on the Florentine Institutions, in the form of dialogue, recovered from the MSS. in the family archives. His works reveal a cold, sordid, selfish, passionate nature, with wonderful powers of analysis and observation, which found a fitting sphere in the social and political decrepitude of Italy in that age. He was of Macchiavellian stamp, only at a lower moral grade. His *Politici Recordi* has been pronounced by a great Italian critic, 'Italian corruption codified.' Guicciardini's outward conduct was singularly correct.

GUICCIOLI, *gwēt-chō'lē* or *gwēt'cho-lē,* TERESA GAMBA, Countess: 1801–1873, Mar. 26; b. Romagna, Italy: known in connection with Lord Byron. When 16 years old she married Count Guiccioli, wealthy nobleman of Ravenna, 50 years older than herself, and two years afterward attracted the attention of Lord Byron while visiting Ravenna, and till 1822 was his inseparable companion. In 1851 she married the Marquis de Boissy, a French senator and peer, and 1869 published *My Recollections of Lord Byron and those of Eye Witnesses of his Life.*

GUICOWAR, *ghī'ko-wâr,* or 'the Herdsman': designation of a powerful Mahratta prince, whose dominions at the present time include most of Guzerat (q.v.), with Baroda for capital. The Guicowar, originally, as the name denotes, was an officer in the establishment of the rajahs of Satara, supreme rulers of the Mahrattas (q.v.), and after a time rose high in rank by his military services, being ultimately appointed hereditary second in command of the Mahratta armies. Pelajee, who became Guicowar 1721, by predatory excursions gradually acquired authority over Guzerat; and his son Damajee, who succeeded 1732, extended the bounds

of this ample dominion. Damajee then threw off his allegiance to the Peishwa, but being taken prisoner by treachery, he was compelled to yield one-half of his dominions, and do homage for the other half. Annund Rao, who ascended the throne 1800, was the first prince of the line who had intercourse with the British Indian govt., and the relations of the British with these Mahratta princes since have been friendly. The Guicowar agreed by treaty to disband his Arab soldiers, and receive a British subsidiary force 1802; and a treaty of general defensive alliance was concluded 1805, by which a British subsidiary force is maintained by the Guicowar. Syajee Rao, who became Guicowar 1819, was frequently reprimanded by the British govt., and in 1838 part of his state was sequestrated. In 1840 he made his submission, among other concessions abolished Suttee. His successor, Mulhar Rao, was accused of attempting to poison Col. Phayre, British resident, and tried before a commission which disagreed about his guilt; but he was deposed for his general misrule, and Gopal Rao, a prince of the Candeish line, was appointed his successor. See BARODA.

GUIDE, n. *gīd* [F. *guider;* It. *guidare,* to show, to direct]: the person or thing that directs; one who leads; a regulator: V. to lead or direct; to influence; to instruct; to superintend. GUI'DABLE, a. *-dă-bl,* capable of being guided. GUIDING, imp. *gī'dĭng.* GUI'DED, pp. GUI'DANCE, n. *-dăns,* a leading; direction; government. GUIDE'LESS, a. *-lĕs,* having no guide. GUIDE-POST, a post at a cross-road, directing the traveller which road to follow. GUI'DER, n. one who, or that which. GUIDE-BOOK, a book for tourists or visitors, containing directions how to visit certain districts or localities, what to see, and where, with useful information in regard to them; an elementary treatise.—SYN. of 'guide, v.': to conduct; direct; pilot; manage; regulate; order; instruct; train; govern.

GUIDE or GUIDES: the attachment or sleeve on the front end of the steam-chest, in which the ends of the valve stems move. Also the piece to which the throttle-valve lever is attached, to prevent it from slipping when the locomotive is in motion.

GUIDE-BARS or GUIDES: the parallel bars between which the cross-heads move, thus giving a perfectly horizontal motion to the piston-rods. They may consist of two parallel bars, "double-guides," or a single guide-bar, attached to the back head of the cylinder and to a support called the "guide-yoke," a strong plate usually fastened to both the frame and the boiler, and placed across the frame at a point well forward of the front driving-wheels.

GUIDE-BLOCKS: the blocks on the back-head of the cylinders, and on the guide-yoke, to which the guide-

bars are attached. In the case of double-guides, these blocks can be planed off so as to permit of the guide-bars being brought nearer together when the slides are worn down; or, liners may be placed between the blocks and the bars, which can be removed when it is necessary to bring the guide-bars closer together.

GUIDE-BRACE: a brace attached to the guide-yoke at one end, and to the boiler at the other, to support the guide-yoke.

GUIDE-YOKE or GUIDE-BEARER. See GUIDE-BARS or GUIDES.

GUIDES, in Military Affairs: usually persons drawn from the country in which an army is encamped. A sufficient body of intelligent guides is collected at head-quarters, to enable one or more to be sent with every detachment of troops which leave the camp. A guide should be quick of eye, experienced in the topography of the country, and, above all, faithful. As guides must mostly be drawn from a hostile population, and have probably only a pecuniary interest in serving well, their conduct is always watched with utmost jealousy, death being the punishment for the least lack of trustworthiness.—In the French army a considerable corps of cavalry and infantry bear the name 'Guides,' [contr. from *guidons*—see GUIDON], so named because they carry the principal guidon or standard. They were formed 1744, as a small company of messengers on active service. The number was gradually increased until Napoleon I. formed them into a guard 10,000 strong.

GUIDO, *gwē'do* or *gô-ē'do*, ALESSANDRO: 1650–1712; b. Pavia: Italian poet. His first pieces drew the notice of the king of Pavia, whose favor he further secured by setting his verses to spirited airs of his own composition. In 1685, with the sanction of the duke, he went to Rome, where his kind patron assigned him apartments in the Farnese palace. He obtained the friendship also of Christina, Queen of Sweden, and composed, at her desire, the pastoral drama of *Endimione*, the princess condescending to be his fellow-laborer in the work. He died at Frascati, of apoplexy brought on by his discovery of a typographical error in a superbly printed copy of poems which he was on his way to present to Pope Clement XI. Guido was squint-eyed and hump-backed. The dramas of Guido fail in sweetness and affection, but are interesting and elevated in sentiment. As a lyrical poet, Guido ranks very high.

GUIDO ARETINO, *gwē'do*, or *gô-ē'do*, *â-rā-tē'no* (named from his birth-place, Arezzo): monk of the Benedictine order: b. prob. in the last decade of the 10th c.: d. 1050, May 17. He has the reputation of being the inventor of musical notation, and the regenerator of music. He was the first who systematically used the lines and intervals of the musical staff, and he is

credited with the introduction of the F clef. The circumstances which led to Guido's invention are differently stated; but the most probable account seems to be, that on one occasion while chanting with the monastery choir (of Pomposa) a hymn in honor of St. John, he was struck with the gradual and regularly ascending tones of the opening syllabic sounds of each hemistich, in the three first verses:

Ut queant laxis	*re*-sonare fibris
Mi-ra gestorum	*fa*-muli tuorum
Sol-ve polluti	*la*-bii reatum, etc.

With the intuitive foresight of genius, he instantly, we are told, comprehended the fitness of these sounds to form a new and perfect system of solfeggio, and forthwith proceeded to mature and systematize this idea. On introducing his new theory into practice among the youthful choristers of the monastery, the experiment proved entirely successful: envy and jealousy, however, were the reward of his innovation. The fame of Guido's musical invention drew to him the attention of the pope (John XX.), who invited him to Rome. Guido went thither, and obtained a gratifying reception. The pope himself found pleasure in becoming a student of the new system, under the guidance of its founder and teacher. Ill health, due to the insalubrious air of Rome, compelled Guido to return to the embracing climate of his birth-place. Guido has left some interesting writings, explanatory of his musical doctrines, viz., the *Micrologus;* and the *Argumentum Novi Cantus inveniendi.*

GUIDO DE BRES, *gwē'dō dėh brā:* 1540–67; b. Mons, Belgium: author of the *Belgic Confession.* He was brought up in the Rom. Cath. Church, converted to Protestantism, forced by religious persecution to leave his native city, joined a Walloon congregation and became a preacher in London, returned to Flanders and founded the first evangelical congregation at Lille 1563, fled to Geneva 1566, became a disciple of Calvin, formed congregations at Tournay, Lille, and Valenciennes, and at the storming of the latter was captured and hanged. *His Confession of Faith of the Reformed Church in the Netherlands* was prepared 1559, and after Calvin's approval, published 1562.

GUIDON, n. *gī'dŭn,* in F. *gē'dŏng* [F.—from *guider,* to guide]: the silk standard or flag of a regiment or squadron of light cavalry, broad at one end and nearly pointed at the other; a small flag or streamer.

GUIDO RENI, *gwē'do rā'nē:* 1575, Nov. 4—1642, Aug. 18; b. Bologna: celebrated painter of the Bolognese school. At first he aimed at the sombre coarse strength of Caravaggio's creations; later he followed the more refined and ideal school of the Caracci; and finally struck out a style for himself. His works are extremely numerous, and the majority reflect a fervent

SAINT MICHAEL, BY GUIDO RENI.

spiritualism, more characteristic of the devotion of the early Bolognese school, than of the later spirit infused by the Caracci, founders of the modern standard of Bolognese art. Guido was unhappily an infatuated gambler, and with the view of replenishing his often-squandered finances, produced with extreme rapidity many inferior works undeserving his name. Among his best productions are *The Crucifixion of St. Peter*, a magnificent work in the Vatican Museum; the *Crucifixion*, in the church of St. Lorenzo, in Lucina, Rome. The famous portrait long assumed to be that of Beatrice Cenci is probably not from his hand: many other works seem to have been falsely attributed to him. The *Aurora*, of Guido, on the roof of one of the halls of the Rospigliosi Palace, a fresco of world-wide fame, is considered the greatest of his works.

GUIENNE, *gē-ĕn′:* one of the 32 provinces into which France, previous to the Revolution, was divided. It comprehended the territory now formed by the depts. of Gironde, Lot, Dordogne, Aveyron and portions of Tarn-et-Garonne, and Lot-et-Garonne, and formed with Gascony (q.v.) what was originally the country of Aquitania, of which name Guido is a corruption. For its earlier history, see AQUITANIA.

GUIGNES, *gēñ*, JOSEPH DE: 1721, Oct. 19—1800, Mar. 19; b. Pontoise: French orientalist. He was appointed interpreter for oriental languages in the Bibliothèque du Roi, and died at Paris. His great work is *L'Histoire Générale des Huns, Turcs, Mogols, et autres Tartares occidentaux, avant et depuis J. C. jusqu'à present* (Paris 1756–58).—His son CHRÉTIEN-LOUIS-JOSEPH GUIGNES (1759–1845, b. Paris), was a distinguished oriental scholar, and published a Chinese Dictionary (Paris 1813), by the orders of Napoleon I.

GUIJAR, or GUIXAR, *gē-ċhâr′:* lake of Central America, in the n.w. of the state of San Salvador; 60 m. in circumference, inclosing a large island, which abounds in game, and contains the ruins of what was evidently a large town.

GUILANDINA, *gī-lăn-dī′na:* genus of shrubs of nat. ord. *Leguminosæ* sub-ord. *Cæsalpinieæ*, having pinnate leaves, and remarkable for the stony hardness of their seeds, the coating of which is so silicious that they are said even to strike fire with flint. The seeds are used for beads and for children's marbles. *G. Bonduc* is the best known species, and is of very wide geographic distribution, though, like the rest of the species, growing only in warm parts of the world. It is called the *Bonduc*, and the *Nicker Tree*, and its seeds, often cast ashore on the coasts of Scotland and Ireland, are called *Molucca Beans*. The cotyledons are very bitter, and are much used in India for cure of intermittent fevers.

GUILD, n. *gĭld* [Dan. *gilde;* Low Ger. *gilde*, a feast, a

contributory company (OE. *gild* or *geld*, a set payment – from *zeldan* or *zyldan*, to pay—whence also the present *yield*), a corporation: Icel. *gildi*, payment, a guild: W. *gwyl;* Bret. *gouil*, a feast]: a society; a corporation; a confraternity. GUILDRY, n. *gĭld'rĭ*, the members of a guild. DEAN OF GUILD COURT: see DEAN. Guilds were originally associations of the inhabitants of particular towns, for promoting the common interest of the fraternity. They are said to be of Saxon origin, but unquestionably similar institutions existed at a very early period among the southern nations of Europe, where they were known by the name of Confraternities. In England, there were guilds during the Saxon rule, and several records are preserved concerning them. The Saxon guilds appear to have resembled the modern friendly societies. On condition of a certain payment, the members were entitled to relief in case of sickness, and to protection from violence. At a later period, guilds were of two kinds, religious and secular. Both classes retained, as a general rule, the principle of mutual relief to members in sickness; but the former were established for works of charity, and regular observance of certain religious services; while the main object of the latter was the advancement of the commercial interests of the fraternity. To legalize the establishment of a guild religious as well as secular, it was necessary that it should receive the sanction of the sovereign; and in the reign of Henry II. several guilds were subjected to heavy fines, as having been established without that authority. In London were many religious guilds. In the reign of Richard II., a guild to the honor of St. George the martyr, consisting of an alderman, master, brothers, and sisters, was established in Norwich; and here, it may be observed in passing, that the term alderman was first a name for a chief officer or governor in a guild whence it was extended to an officer of a burgh on the extension of guilds, as noticed below. The above guild having been an orderly virtuous society for 30 years King Henry V. confirmed it by letters-patent under the Great Seal, made it perpetual, and granted it certain privileges and immunities (Madox, *Firma Burgi*). In like manner, guilds were formed in Bristol, Exeter, and other large towns. These guilds, through the munificence of individuals, by degrees amassed considerable wealth. By Henry VIII. the property and revenues of these religious guilds were seized and perpetually vested in the crown.

The most important branch of this subject is that of the secular guilds, styled in s. Europe, confraternities. These institutions were the germ of the modern burghs or municipal corporations. They consisted originally of the members of some particular trade, united for mutual assistance in sickness, and for maintaining the interests of the trade; e.g. the guild of goldsmiths, of

weavers, of cordwainers, of pattern-makers, of spectacle-makers, etc., the names of which are preserved to the present day. Every trade had its separate guild of which it was necessary that a man should be a member before he was allowed to practice the particular craft. As trade increased in importance, the influence and power of the guilds increased in proportion, until at length the towns or united guilds claimed from the sovereign special rights and privileges—*quod habeant gildam mercatoriam.* The town of Southampton received a charter confirming their liberties as early as Henry II. Liverpool was made a *gilda mercatoria* by Henry III. In the reign of Henry VI., the title used was *communia perpetua* or *corporata*, which phrase has continued to be used in the modern corporations. This title of *communia* appears to have been borrowed from the continent, where, under the title of communities, the towns at a very early period obtained charters declaring their independence, and bestowing on them extensive privileges.

The exclusive privileges of English and Scottish guilds or corporations are now abolished, as being contrary to public policy; and these associations exist only for beneficiary purposes. Thus, in various boroughs in England, a custom had long prevailed, and by-laws had been made, to the effect that no person, not being free of the borough or of certain of these guilds, should keep a shop for merchandise, or exercise certain trades within the borough; but since 1835, when the Municipal Corporation Reform Act passed, every lawful occupation is free, notwithstanding any such custom or by-laws. The exclusive privilege of trading in Scotch burghs was abolished 1847.—See Brentano, *On the History of Gilds* (1870); Toulmin Smith, *English Gilds* (1870); works by Schonberg, Neuburg, Schmoller (1880).

GUILDER, n. *gĭld'ėr:* a coin in Holland worth about forty cents; a florin.

GUILE, n. *gīl* [OF. *guille*, deceit; Dut. *ghijlen*, to delude: Low Ger. *gigeln*, to deceive by juggling tricks]: craft; cunning; artifice; duplicity: V. in *OE.*, to deceive; to disguise. GUIL'ING, imp. GUILED, pp. *gīld.* GUILE'FUL, a. *-fûl*, crafty; insidious; wily. GUILE'FULLY, ad. *-lĭ*, in a guileful manner; treacherously. GUILE'FULNESS, n. GUILE'LESS, a. artless; frank; free from guile. GUILE'LESSLY, ad. *-lĭ.* GUILE'LESSNESS, n. GUIL'ER, n. *-ėr*, a deceiver. *Note.*—GUILE is the same originally as AS. *wile* in *wily*—Max Müller.

GUIL'FORD COURT-HOUSE, BATTLE OF: 1781, Mar. 15, in Guilford co., N. C., 5 m. from Greensborough; between a British force of 2,400 veterans under Lord Cornwallis, and an American force of about 4,500—of whom 3,000 were raw militia—under Gen. Greene. Two lines of militia were forced back by the British, but when they charged the third line, composed of veterans and deployed near the court-house, they were repulsed with

considerable loss. Greene, unwilling to risk another attack, ordered a retreat, and Cornwallis instead of pursuing fell back on Wilmington. British loss 600 killed and wounded; American 400 killed and wounded, 850 missing.

GUILLAUME, *gwĭ-yōm′*, EUGENE, French sculptor: b. Montbard, France, 1822, July 4; d. Rome, Italy, 1905, Feb. 28. He opened his first studio at Dijon, and subsequently became a pupil of Pradier at Paris. In 1845 he carried off the Grand Prix de Rome. It was during studies at Rome that he manifested that mastery of the human form which appears in his *Reaper*, which he modeled at Rome. It was subsequently cast in bronze, and is now in the Luxembourg. In 1852 he produced in marble the sitting figure of Anacreon with the dove of Venus. He was, however, less successful in ideal creations than in portrait busts. His statues of Napoleon I. as lieutenant of artillery and as emperor, his bust portraits of Archbishop Darboy, of F. Baloz, Ferry, and Thiers are characteristic and dignified, but he is perhaps best known for his sculptures on the façade of the New Opera House, Paris (1869); *The Fount of Poetry* (1873); *Aopheus* (1878); *Two Hermes; Anacreon with Eros;* and *Sappho with Eros and Andromache.* He was the designer of the medals given at the expositions of 1867 and 1878.

GUILLEMET, JEAN BAPTISTE ANTOINE, *zhŏn bâp-tēst ân-twân gwĭ-yĭ-mā*, French painter: b. Chantilly 1842. After studying under Corot and Oudinot he exhibited for the first time in 1865. He chooses for his subjects the scenery of Normandy, and the Seine valley, and is faithful in his transcripts from nature, but his work lacks the color and subtility as well as the imagination of the Barbizon school. His *View of Bercy* and *View of Paris* are in the Luxembourg.

GUILLEMOT, n. *gĭl′lĕ-mŏt* [F.]: a thick clumsy seafowl, found in northern Europe, Asia, and America, resembling the puffin or razor-bill.

GUILLEMOT, *gĭl′lĕ-mŏt* (*Uria*): genus of web-footed birds, of the group *Brachypterœ* (q.v.) or Divers; included by Linnæus in the genus *Colymbus* (see DIVER), but now generally ranked among the *Alcadœ* (see AUK) than among the *Colymbidœ* (q.v). The bill is moderately long, straight, and pointed, as in *Colymbus,* but rather more compressed, and covered with feathers as far as the nostrils; the feet, as in the other *Alcadœ*, are three toed, having no hind-toe, and entirely webbed. The legs are placed very far back, and are very short, the tibia scarcely appearing beneath the abdomen, so that they are ill adapted for walking, and the posture of the bird on land is erect, even when hatching its egg. The tail is very short. The wings are short, and are moved with great frequency in flight, which, however,

the guillemots are able to sustain remarkably well, in consequence of the abundant provision made for aëration of the blood by their very large air-cavities. On the same account they usually float very high in the water, though when danger approaches they can sink their bodies under water till only the head, neck, and upper part of the back are visible. They excel in diving, and use their wings for progression under water, where they seek their food, which consists chiefly of small fishes and crustaceans. They are seldom seen in the seas of warm latitudes, but are extremely abundant in those of the arctic regions and the colder parts of the temperate zone, particularly near rocky coasts. The COMMON GUILLEMOT, or FOOLISH GUILLEMOT (*U. troile*), is abundant on many parts of the British coasts, breeding even on those of the south of England, though large flocks also arrive in winter from the north. It abounds in all the arctic regions. Its winter migrations extend as far south as the Mediterranean, and in America to New York. It is called Foolish Guillemot, from its often suffering itself to be taken by the hand rather than leave the cliffs on which it breeds, and where prodigious numbers may be seen stationed close together on the ledges of rock. The parent birds are said to carry their young on their backs from the high ledges to the water. The entire length of the Common Guillemot is about 18 inches. The Common Guillemot lays only one egg, which has a very thick shell, is pear-shaped, and remarkably large, being more than three inches long. If the egg is destroyed or taken away, another is laid in its stead. The egg is esteemed a delicacy, but the flesh of the bird is coarse. The skin with the feathers is used for clothing in some northern regions. Young birds and eggs are among the objects in pursuit of which the rock-fowlers of the northern coasts scale or descend tremendous precipices. Great numbers of the eggs are exported from the coasts of Newfoundland and Labrador. The BLACK GUILLEMOT (*U. Grylle*), sometimes called the Greenland Dove, is a smaller species, about 14 inches long; the plumage entirely black in summer, except a large white patch on each wing; but in winter, the under parts are white; the young are mottled or spotted. It is plentiful in the arctic regions, and is as common in America as in the old world. It lays three eggs, often on the bare rock; but if the situation is damp, it piles up for them a curious nest of pebbles. *U. californica* is found on the w. coast of N. America.—Many other species are enumerated.

GUILLOTINE, n. *gĭl'lō-tēn* [after *Joseph Ignace Guillotin* (1738–1814), a French physician, who is said to have first suggested in the French convention its use in capital punishment as more humane]: in France and other countries, a machine for beheading at a stroke in carrying out a sentence of capital punishment: V.

to take off the head by the guillotine. GUIL'LOTINING, imp. GUIL'LOTINED, pp. *-tēnd.*—The Guillotine is composed of two upright posts, grooved on the inside, and connected at the top by a cross-beam. In these grooves, a sharp iron blade, placed obliquely, descends by its own weight on the neck of the victim, who is bound to a board laid below. The speed and certainty with which this machine separated the head from the trunk, gave it great superiority over the axe or sword. The invention of machines of this kind is ascribed to the Persians. In Italy, from the 13th c., it was the privilege of the nobles to be put to death by a machine of this kind, called *Mannaia.* Conradin of Swabia was put to death by such a machine at Naples 1268. An instrument resembling the guillotine was employed likewise in Germany during the middle ages. During the 16th, and till late in the 17th c., a machine called the *Maiden,* which differed but slightly from the guillotine, was used in Scotland for decapitation. That such an apparatus was known and used in France at an earlier period, is proved by the execution in the case of the Duc de Montmorency, which is described as by a falling axe at Toulouse 1632. The Dutch in the 18th c. employed a decapitating machine in executing slaves in their colonies. Dr. Guillotin was not the inventor of the instrument which bears his name, and had only a secondary share in its introduction into France. As a member of the constitutional assembly he proposed to that body to abolish all class distinctions in the method of inflicting capital punishments, and with that view to have some instrument invented which might do the work more quickly and certainly than the hand of the headsman. The establishment of a new penal code having now become the subject of deliberation, a vote for a uniform system of capital punishment was, on the motion of Dr. Guillotin, passed in 1789, Dec. 21, with a recommendation that the least painful method of inflicting it should be adopted. It was not till 1792, however, that this special machine was selected after a report from Dr. Ant. Louis, secretary to the College of Surgeons. The guillotine was first erected in the Place de Grève at Paris, and the first execution performed by it in 1792, April 25, on a highwayman. Shortly afterward, in remembrance of Guillotin's original proposition, it received the name of 'guillotine,' both popularly and in official language.

GUILT, n. *gĭlt* [Swiss, *gült;* Dan. *gjeld,* debt: AS. *gildan;* Dan. *gield;* Ger. *gelten,* to requite, to return an equivalent]: crime; offense; state of being tainted with sin or crime. GUILT'LESS, a. innocent; free from crime. GUILT'LESSLY, ad. *-lĭ.* GUILT'LESSNESS, n. GUILTY, a. *gĭl'tĭ,* not innocent; justly chargeable with crime. GUIL'TILY, ad. *-lĭ.* GUIL'TINESS, n. consciousness of crime; wickedness. *Note.*—Among the anc. warlike races 'eow-

ardice or fear' was the greatest crime, as 'bravery (*virtus*)' was the highest virtue. This consideration may give value to the suggested Gael, etymology, *gealt*, fear, cowardice.

GUILTY: the form of verdict given by a jury in criminal cases when the crime charged has been found proved. In England and the United States, there are only two verdicts which can be given in such cases—viz., guilty or not guilty; but in Scotland there is an intermediate verdict called 'not proven,' which, though in reality a verdict of 'not guilty' (and so entered on record), yet is allowed to be given by juries when they are not satisfied that sufficient legal evidence has been given, but nevertheless consider there was some foundation for the charge, or at least some ground for suspicion. It has been objected to this Scotch verdict that it leaves a stigma on the party; nevertheless, it is firmly adopted in the law and practice of Scotland.

GUIMET'S ULTRAMARINE, *gē-māz' ŭl'tra-ma-rēn'* [from its discoverer, Jean-Baptiste *Guimet*, chemist]: French ultramarine, a factitious pigment of a fine azure color; compound of alumina, soda, sulphur, and a trace of iron; a useful substitute for the more costly ultramarine. It is transparent and durable.

GUINEA, n. *gĭn'ē* [as having been first coined of gold from *Guinea*, in Africa]: a gold coin of the value of 21s., formerly current in Britain. By reason of the origin of its gold, it originally bore the impression of an elephant. It was coined first during the reign of Charles II., 1664, and continued in common use till 1817, when it was superseded by the *Sovereign* (q.v.). Its value varied considerably at different periods, but was latterly fixed at twenty-one shillings. It is still customary in Great Britain to estimate professional fees, honoraria of all kinds, complimentary subscriptions, prices of pictures, etc., in guineas; to give a physician three sovereigns and three shillings, rather than three sovereigns alone, or even three sovereigns and five shillings, is supposed to make the transaction differ from a mere mercantile one, and thus veils the sordidness which is fancied to attach to pounds, shillings, and pence. GUINEA, a. of or belonging to Guinea, as *guinea-hen*. GUINEA-PIG, a small tailless animal of the rodent or gnawing order, covered with white, red, and black patches, from S. America; probably named from a corruption of *Guiana-pig;* a cony (see CAVY). GUINEA-HEN, in *OE.* a courtesan whose favors are obtained by money.

GUINEA, *gĭn'ē:* a maritime region of w. Africa. It extends from the neighborhood of the Senegal to the vicinity of Cape Negro, the stream being in lat. 16° n., and long. 16° 33′ w., and the headland in lat. 15° 41′ s., and about long. 11° 40′ east. By the equator, which thus intersects it, it is divided into upper or northern,

and lower or southern Guinea. This vast region forms the coasts of the Mandingoes, Ashanti, Dahomey, Benin, Biafra, Loango, Congo, Angola, and Benguela, connecting with the Atlantic distant territories by means of its rivers, especially by the Senegal, the Gambia, the Niger, the Old Calabar, the Zaire or Congo, and the Coanza. Guinea was visited first 1364 by some French merchant adventurers of Rouen and Dieppe, and colonized first by the Portuguese 1481, who have retained nominal possession of the whole of Lower Guinea, the chief states of which are Loango (q.v.), Congo (q.v.), Angola (q.v.), and Benguela (q.v.). The Dutch, French, English, Danes, and even the Germans, also established various settlements, or rather factories, particularly in Upper Guinea, the coast of which is now divided into Grain Coast, Ivory Coast, Gold Coast, and Slave Coast. Besides the articles thus designated, the soil yields indigo, pepper, cotton, sugar, and palm-oil. The factories were established chiefly to secure the slave-trade, and after its suppression their commercial importance ceased. Great Britain has ultimately endeavored to make a humane use of its acquisitions. While keeping a naval squadron off the w. African shores to intercept the slavers, it was needful to provide for the liberated cargoes of black men and women. The Sierra Leone (see FREE TOWN and SIERRA LEONE) and Gambia settlements were created for this purpose, and here the Wesleyans have many chapels and schools for the natives. For the American settlement see LIBERIA: MONROVIA. The Gold Coast, 250 m. in length, is the outer margin of a plain, bounded landward by hills covered with primeval forest. It is now wholly in the hands of the English, to whom, 1872, the Dutch sold their possessions, including the important settlement of Elmina, the port of Axim, Winnebah, Accra, etc. The chief English settlement is Cape Coast Castle. The Fantees are the chief native tribe. Captain R. F. Burton and Commander Cameron, who visited the district 1881, reported that the Gold Coast was worth several Californias, gold being found in the sea sand. In 1903 this large region was politically divided as follows: the French colony of Senegal, the English settlements on the Gambia, the Portuguese territory of Bissao, the free negro republic of Liberia, the Ivory, Gold and Slave Coasts, the Niger delta, and the Cameruns, in Upper Guinea; and in Lower Guinea, the Spanish settlements on Corisco Bay, Gaboon, the Congo Free State, and the Portuguese territories of Ambriz, Angola, and Benguela.

GUIN'EA, GULF OF: portion of the Atlantic Ocean, extending into the great bend of the w. African coast. It stretches from about Cape Palmas, long. 7° 44′ w., to Cape Lopez, about lat. 1° south. At its n.e. extremity is the delta of the Niger, between the Bight of Benin on the n.w., and the Bight of Biafra on the s.e. Off its

shore, reckoning from the n., are the islands of Fernando Po, Prince, and St. Thomas.

GUIN'EA CORN: a name given sometimes to Durra (q.v.) sometimes to another cereal grass, *Penicillaria spicata* or *Pennisetum typhoideum*, extensively cultivated in central Africa, and to some extent in India, where it is called *Bajree*. It is of the tribe *Paniceæ*, and may be regarded as one of the millets. It is a grass with a spike-like cylindrical panicle.

GUIN'EA FOWL, or PINTADO, *pĭn-tâ'dō* (*Numida*): genus of gallinaceous birds of the family *Phasianidæ*, having a short, strong bill, the upper mandible vaulted, a warty membrane at the base of the bill, and a wattle hanging down on each side, the head and upper part of the neck generally naked, the forehead surmounted either with a callous or feathery crest; the back much elevated and arched, the tail short. All the species are natives of Africa and Madagascar. The best known is the common Guinea Fowl, or Pintado (*N. Meleagris*), with naked head, hard callous casque, and slate-colored plumage, everywhere speckled with round white spots of various sizes. It is common in Guinea, and apparently through all the regions thence to the neighborhood of the Cape of Good Hope; it is found also in more northern parts of Africa, and was known to the ancient Romans, by whom it was called *Meleagris* and *Gallina Numidica*. Its flesh was highly prized by them. In a wild state the guinea fowl is generally in large flocks. It is not so polygamous as many of the gallinaceous birds, and even in domestication exhibits the inclination to pair. It is now not rare in the poultry-yards of parts of America and Europe, though it is more adapted to warm than to cold climates, and in Jamaica, has been completely naturalized, so as to be destructive to crops, and to be shot like other game. In colder regions, though the young are rather troublesome to rear, the high price brought by the birds and their eggs, compensates those who keep guinea fowls for profit. The eggs are small, and have a thick strong shell, but are particularly esteemed. Guinea fowls are troublesome in a poultry-yard, from the disposition of the males to attack and tyrannize over other poultry. The guinea fowl has a peculiar harsh and querulous cry, which it emits with great frequency. There is a white variety.

GUIN'EA GRASS, (*Panicum maximum*): grass of the same genus with MILLET (q.v.), native of w. Africa, but now naturalized, and extensively cultivated in the W. Indies and in the southern states. It does not perish in the winters of colder countries, but is not luxuriant and productive, as in warmer climates. Its height, in favorable moist situations, is 5 to 10 ft.; in dry grounds, it is smaller; it has a much-branched and spreading panicle, long flat leaves and a somewhat creeping root. In countries favorable to its growth, it is very valuable

food for cattle.—Other species of the same genus are among the most useful pasture and forage grasses of tropical countries.

GUIN'EA PEP'PER: name variously applied to the seeds or dried fruit of several very different plants, agreeing in their peppery character, and in being the product of w. Africa. The name MALAGUETTA (Malagheta, Meleguetta, etc.) PEPPER is generally equivalent to guinea pepper, and is at present a frequent designation of *Grains of Paradise* (q.v.); but the capsules or dry berries of *Capsicum frutescens* (see CAPSICUM) are commonly sold by druggists under the name Guinea Pepper; while both the names guinea pepper and Malaguetta Pepper have been applied to the dried fruit of *Cubeba Clusii* (see CUBEBS), and to the seeds of *Habzelia* (or *Xylopia*) *Æthiopica*, a shrub of the nat. ord. *Anonaceæ*. This last, formerly a considerable article of export from Guiana, and sometimes called ETHIOPIAN PEPPER, is now seldom heard of. It is an aromatic and not extremely pungent condiment.—There is great difficulty in determining which of these kinds is meant in many instances in which the term guinea pepper or Malaguetta Pepper is employed by the older writers; yet from the importance of the trade in this article, the name *Grain Coast* was given to a great tract of land in the Bight of Benin, and to it the establishment of the settlements of Grand Bassa and Cape Palmas is due. Till the close of the 18th c., guinea pepper continued in request, when the peppers of the east drove it from the market.

GUINEA-WORM, a nematode worm (*Filaria medinensis*), the female of which may be three feet long, and as thick as a knitting-needle. It is a parasite in the feet and toes of residents of the East Indies and African coast, forming abscesses beneath the skin in which the worm is coiled up. It produces the disease known to the Greeks as dracontiasis, and one of those now called filariasis (q.v.). To extract the worm it must be slowly wound upon a roll of paper, a little at a time, care being taken not to break the worm, as if a portion is left in the abscess, the young will develop and be scattered under the skin. Although formerly confined to the Old World, the guinea-worm has recently been found in the tropics of America, but is very rarely seen in northern parts.

GUINEGATE, BATTLE OF; or, more familiarly, the *Battle of the Spurs:* at Guinegate, not far from Tournai, province of Hainault, Belgium, 1513, Aug. 16; between the English, under Henry VIII., assisted by a considerable body of troops headed by Emperor Maximilian, and the French, under Duc de Longueville. The French were defeated. The battle received its familiar designation from the circumstance of the French knights having made better use of their *spurs* than their *swords*.

GUINEY, Louise Imogen, American poet: b. Boston, 1861, Jan. 7. She began to write for publication in 1880 and was a frequent contributor to *The Pilot*, Boston. Her published works include *Songs at the Start* (1884); *The White Sail and Other Poems* (1887); *A Roadside Harp* (1893); *Marty's Idyl and Shorter Poems* (1899); and in prose she has also published: *Goose-Quill Papers* (1885); *Brownies and Bogies; Monsieur Henri* (1892); *A Little English Gallery; Lovers' Saint Ruths; Patrins* (1897); *The Secret of Fougereuse; Hurrell Fraude—Memoranda and Comments* (1904); etc. She has edited an edition of Mangan's poems.

GUISCARD, *gēs-kâr'*, Robert, Duke of Apulia and Calabria: 1015–1085, July 17; sixth in order of seniority of the 12 sons of Tancred de Hauteville. Tancred's estates in Lower Normandy being insufficient to support such a numerous family, his three eldest sons, William, Dagobert, and Humphrey, sought their fortunes in the wars of Italy. By good-fortune, courage, and wiles, William gained possession of Apulia; and Robert, desirous of sharing his brothers' success, followed them to Italy with a small band of adventurers. Here he distinguished himself so highly in various battles, that, after the death of William and Humphrey, he was proclaimed Count of Apulia. Guiscard next conquered Calabria, in the possession of which he was confirmed by Pope Nicholas II., who, but a short time before, had excommunicated him for his many acts of violence. Guiscard, from motives of gratitude, bound himself to pay an annual tribute to the Roman see. The feudal superiority still claimed by the papal see over Naples dates from this period. Guiscard now dispatched his youngest brother, Roger, at the head of 300 warriors, to conquer Sicily, the possession of which had been promised to him by the pope. Roger took Messina 1060, and in the following year the two brothers defeated the Saracens at Enna. Roger eventually conquered the whole island, and became first Count of Sicily. Meanwhile Robert gradually gained possession of the towns that still remained in the hands of the Saracens, among others, Salerno and Bari, and thus established what was till 1860 the kingdom of Naples. He would have carried his victorious standard in other directions, had he not been excommunicated by Gregory VII., for his inroad into Beneventum. Having become involved in the affairs of Greece by the marriage of his daughter Helena with Constantine Ducas, son and heir of Michael VII., he dispatched his son Bohemond to undertake the conquest of Corfu, while he himself hastened to Durazzo, and before the walls of that city gained a brilliant victory over the Greek emperor, Alexius Comnenus. He now marched through Epirus to Thessalonica, and had nearly reached Constantinople, when he received information that Emperor Henry IV. had made an inroad

into Italy. He immediately hastened back, after intrusting the chief command to Bohemond, compelled Henry to retreat, and liberated the pope, who was besieged in the castle of San Angelo. He then returned to Epirus, defeated the Greeks in several engagements, took possession of some islands in the Archipelago, and was on the point of advancing a second time to Constantinople, when he died at Cephalonia. His remains were buried at Venusa; his sons Bohemond and Roger inherited his possessions: the former received Tarentum; the latter Apulia. Guiscard was not only a hero and a conqueror, but a patron of the arts and sciences.—Compare Gaultier d'Arc. *Histoire des Normands en Italie, en Sicile, et en Grèce* (1830); and works by Dondorff (1875) and Steenstrup (1876).

GUISE, n. *gīz* [F. *guise;* Sp., It. *guisa;* W. *gwis;* Bret. *giz,* way, manner]: external appearance; dress; manner; custom. GUISARDS, n. plu. *gī'zėrts,* or GUI'SERS, n. plu. *-zėrs,* in *prov. Eng.,* persons, chiefly young persons, who go from house to house in a sort of masquerade, about Christmas time, singing songs and soliciting contributions for holiday purposes; immediately before the New Year there is a similar practice in Scotland.

GUISE, *gēz* or *gwēz:* town of the dept. of Aisne, France, on the left bank of the Oise, 37 m. n.n.e. from Soissons. It is walled, and otherwise fortified. It is an ancient town, and was of much consequence in the early wars of France. Within the town are the ruins of a castle, from which the famous Dukes of Guise derived their title. Guise is now a place of considerable commercial and industrial activity; has linen and cotton manufactures, tanneries, etc., weekly markets, and 8 annual fairs. Pop. 7,300.

GUISE: name of a branch of the ducal family of Lorraine, distinguished in the history of France and Europe during two centuries. It derives its name from the little town of Guise, in the department of Aisne (situated on the Oise). The following are its most remarkable members:

CLAUDE OF LORRAINE, first Duke of Guise, Peer of France, Grand Huntsman, Count d'Aumale, Marquis of Mayenne and Elbeuf, Baron of Joinville, etc.: 1496, Oct. 20—1550, Apr.; b. at the Chateau of Condé; fifth son of René II., Duke of Lorraine. He left Lorraine on account of a quarrel with his elder brother, accompanied Francis I. to Italy, and received 22 wounds at the battle of Marignan, 1515. Eight years later, he drove the Germans from Champagne. In 1542 he fought in Flanders under the Duke of Orleans. He was favored by the king for his valor and talent. He married Antoinette of Bourbon, by whom he had 12 children, eight being sons. His daughter Mary was the wife of James V. of Scotland, and mother of Mary, Queen of Scots. He is reported to have died of poison.

GUISE.

François of Lorraine, second Duke of Guise; 1519, Feb. 17—1563, Feb. 24; son of Claude of Lorraine, first duke. As a general, he acquired European renown. He distinguished himself at Montmedy (1542), Landrecies (1543), St. Dizier (1544), Boulogne (1545), and attracted the attention of France by his defense of Metz, besieged for two months by Charles V., who, after firing 11,000 balls, and losing 30,000 men, was obliged to raise the siege (1553). He added to his reputation at Renti (1554), and in 1556 took command of the expedition against Naples. This expedition failed through treachery; but the duke, having been made lieut.gen. of France, retrieved his reputation by taking Calais, Guines, and Ham, which were in possession of the English, and were considered impregnable. His military successes were ended by the peace of 1559. His niece, Mary Stuart, being the wife of Francis II., he became the highest power in the state, and the head of the Rom. Cath. party. The death of the king, and a strong party against him, drove him from the court, but he was soon recalled, to take command against the Huguenots who had taken several important towns, and were committing great ravages. He retook Rouen, and conquered at Dreux (1562). The Maréchal St. Andre was killed, the Prince of Condé and the Constable taken prisoners. Guise, the greatest of his name, was assassinated before Orleans. He had a taste for literature, and his memoirs, written by himself, have much historic interest.

Henri I. of Lorraine, third Duke of Guise: 1550, Dec. 31—1588, Dec.; son of Duke François. The death of his father placed him at the head of the Rom. Cath. party. Ambition and vengeance both stimulated him to action. At the age of 16, he distinguished himself in fighting against the Turks in Hungary. Three years later, he fought with the Huguenots at Jarnac (1569, Mar.), and Moncontour (1569, Oct.), and in the same year forced Coligny to raise the siege of Poitiers. He aspired to the hand of Marguerite of Valois, but, to appease the anger of the king, married Catherine of Clèves, 1570. Disgusted with the favors granted to Protestants at the court, he retired, but returned, and was engaged in the massacre of St. Bartholomew, 1572, Aug. 24, in which he saw the dead body of Coligny thrown from a window into the courtyard at his feet. In 1575, fighting with the Huguenots, he was wounded in the face, whence he received the name *Balafre* (scarred), a designation borne also by his father from a similar circumstance. He formed the famous League—ostensibly for the defense of the church, really to raise himself to the throne of Charlemagne. The king coquetted with both parties. Guise conquered Henri of Navarre, but the king refused him entrance to Paris. The people rose in his favor, and he might have been king, but he negotiated. He was promised all the powers which he demanded, but

the king caused him to be massacred in the palace, and is said to have kicked his lifeless body. His brother the cardinal also was killed. Their bodies were burned, and their ashes scattered to the winds.

Henri II. of Lorraine, fifth Duke of Guise: 1614–64; grandson of Duke Henry I. He was intended for the priesthood, and at the age of 12 possessed nine abbeys; at 15, he was Abp. of Reims, but on the death of his elder brother he quitted a calling which he detested, and succeeded to the dukedom. Handsome, chivalric, brave, he was a true specimen of the ancient paladin, and noted for his numerous gallantries. Loved by Anne de Gonzague, Princess of Mantua, he capriciously abandoned her, joined the party of the Comte de Soissons, and married the widow of the Comte de Bossut. Having joined the league against Richelieu, he was condemned by the parliament of Paris to capital punishment, but took refuge in Germany. On the death of Louis XIII., he returned to France, disgusted with his wife, whose fortune he had spent, and proposed to marry Mademoiselle de Pons, one of the queen's maids of honor. He fought in the campaigns of 1644–5 as a volunteer, and then repaired to Rome to get a divorce, but failed. Hearing of the revolt of Naples against Spain, under Massaniello, he set off for that city, in a spirit of knight-errantry, to conquer a kingdom with his sword for the bride that he still hoped to gain. Passing in a felucca through the Spanish fleet, Guise entered Naples 1647, Dec., and was received with the utmost enthusiasm; but his gallantries, the envy of the nobles, and jealousy of France, caused him to be betrayed, 1648, Apr., to the Spaniards, and he was carried prisoner to Spain. Demanded by Condé, he was set at liberty 1652, and joined, with Condé, the enemies of the court and of Mazarin at Bordeaux. Two months later, he had betrayed his allies, and was at Paris with the king, but misfortune still followed him, and he found that his mistress, for whom he had endured so much, was false and that with his own esquire. Finding himself an object of ridicule at Paris, he attempted to return to Naples, but failed; returned to Paris, was made grand chamberlain, there directed the magnificent fêtes of Louis XIV., and died, leaving no children. His *Mémoires* (2 vols., Paris 1669) were really written by his secretary, St. Yon.

Henry II. was succeeded by his nephew Louis Joseph, Duke of Guise, Joyeuse, and Angoulême. With the son of the latter, François Joseph, who died 1675, the direct line of the Dukes of Guise of the house of Lorraine became extinct. The family possessions passed to the Condé, as being the nearest of kin among French houses. Charles, Duke of Mayenne, one of the most zealous leaders of the League, was a member of the house of Guise. He died 1611. Of the descendants of Henry I., the most notable were Charles, who inherited his father's

dignities, and died in Italy, whither he had been banished by Richelieu 1640; and Claude, Duke of Chevreuse, whose wife was Maria von Rohan-Montbaz, widow of the Constable de Luynes (d. 1679). Louis de Lorraine, Cardinal de Guise (b. 1580, d. 1621), was a nephew of the fifth duke of Guise. Entering the priesthood against his inclination, he became abp. of Rheims 1615. He had five illegitimate children by a mistress of King Henry IV. See Bouillé *Histoire des Dues de G.* (4 vols. Paris 1850).

GUITAR, n. *gĭ-târ'* [F. *guitare*—from Sp. *guitarra*, a guitar: L. *cithără*, *a* harp]: a stringed musical instrument with an oval body, and a neck like that of the violin. The modern or Spanish guitar has six strings, the three highest of gut, the three lowest of silk covered with fine wire, and tuned to the E in the second space of the bass staff, A, its fourth, and the treble D, G, B, and E. The intermediate intervals are produced by bringing the strings, by the pressure of the fingers of the left hand, into contact with the frets fixed on the key-board, while those of the right pluck or twitch the strings. The Spaniards are supposed to be the inventors of the guitar, and it is most widely used in Spain, though its use is quite general in other countries.

GUITEAU, Charles Julius: an American assassin: b. about 1840; was a lawyer in Chicago. After the election of James A. Garfield to the presidency of the U. S. in 1880, Guiteau went to Washington to seek the office of U. S. consul at Marseilles. He was unsuccessful in his purpose and owing to his failure and the fact that the new president was opposed to the "Stalwarts," led by Roscoe Conkling, became greatly incensed. Guiteau shot the president in the waiting room of the Baltimore and Potomac railroad at Washington, 1881, July 2, and the president died from the effects Sept. 19 following. Guiteau was arrested, indicted for murder, and was hanged, 1882, June 30.

GUIZOT, *gē-zō'* or *gwē-zō'*: François Pierre Guillaume: 1787, Oct. 4—1874, Sep. 12; b. Nîmes: French statesman and historian. His parents were Protestants; his father, an advocate, perished on the scaffold, 1794, Apr. 8, and his mother soon afterward went with her two sons to Geneva, where Guizot received his education. In 1805, he went to Paris, and engaged in literature. His first work, the *Nouveau Dictionnaire Universel des Synonymes de la Langue Française* (2 vols.; 4th ed. Paris 1848), appeared 1809; the introduction reveals a very methodical mind. The next seven years was spent in laborious literary activity. After the second Restoration, he became general sec. to the ministry of the interior, afterward to the ministry of justice. On the retirement of Barbé-Marbois, Guizot tendered his resignation, and was first appointed *maître des requêtes*, after-

ward councilor of state. Guizot contributed to the dissolution of the *Chambre Introuvable,* by writing a memorial which was placed in the hands of Louis XVIII., by Decazes. The latter committed to him the general direction of the administration of the *communes* and *departements* (1819). His writings 1820–22 are entitled *Du Gouvernement de la France depuis la Restauration et du Ministère Actuel* (1821), *Histoire des Origines du Gouvernement Representatif,* containing his lectures at the Sorbonne (where he held the position of lecturer on history) 1820–22 (new ed. 1852). Government forbade his lectures 1824, and Guizot again betook himself to literature. In conjunction with several other men of letters he published the important *Collection des Mémoires Relatifs à l'Histoire de France, depuis la Foundation de la Monarchie jusqu'au 13me Siècle* (31 vols. Paris 1823–33) ; and the *Collection des Mémoires Relatifs à l'Histoire de la Révolution d'Angleterre* (26 vols. Paris 1823). He likewise edited several works of other authors, with introductions, annotations, and additions, such as Letourneur's translation of Shakespeare (12 vols., Paris 1821), Hallam's *History of England* and Mably's *Observations sur l'Histoire de France,* followed by the *Essais sur l'Histoire de France.* In addition he published *Histoire de la Révolution d'Angleterre* (2 vols. Paris 1826; 4th ed. 1845), and edited the *Encyclopédie Progressive,* and the *Revue Française.* In the following year, the Martignac ministry granted him permission to resume his course of lectures on history. These were attended by a large and enthusiastic audience, and gave rise to several historical works of great value, published under the collective title of *Cours d'Histoire Moderne* 1828–30) ; among others, the *Histoire de la Civilisation en France depuis la Chute de l'Empire Romain jusqu'à la Révolution Française* (5 vols. Paris 1828–30; 5th ed. 1845), and the *Histoire Générale de la Civilisation en Europe,* etc., which serves as an introduction to the former work. 1829, March 1, he again took his place in the council of state, and 1830, Jan., was elected by the town of Lisieux, which he continued to represent in the chamber.

After the July revolution, Guizot became successively minister of public instruction and minister of the interior, an office which he held, with two interruptions, till 1836. In this capacity he did much for improvement of educational institutions, particularly primary schools. On the breaking out of the Eastern disturbances in the beginning of 1840, under Soult's administration, Guizot was sent as ambassador to London. After Soult's retirement 1847, Sep., he became the official leader of the cabinet, which maintained its ground, as the organ of Louis Philippe's policy, till the revolution of 1848, Feb., and by its conduct both in home and in foreign affairs, did much to bring constitutional government

into disrepute, and to hasten the overthrow of the Orleans monarchy. As a statesman, Guizot in carrying out his systematic and repressive line of policy, proved himself stiff, one-sided, and latterly obdurate; from these qualities, as well as from his cold and disagreeable manner, he was always very unpopular with the nation. As a man of rectitude and austere morals, he never enriched himself at the public cost; but, nevertheless, from political motives, he allowed others to do so during his administration, in the most flagrant manner. After having effected his escape from Paris, he retired to London, where he was received with great respect. In 1849, Apr., he published a circular *Guizot à ses Amis*, in which he offered his services to the electors of France, but ineffectually. In Nov. following, he returned to Paris, where he continued to labor in conjunction with the heads of the monarchical parties. After a short visit to Louis Philippe in England, 1850, June, he came forward in Paris as the main promoter of the fusion, and wrote likewise in the *Assemblée Nationale*. The *coup d'état* of 1851, Dec. 2, put an end to this career; and Guizot returned to England. By founding the *Comités Historiques*, by bringing about the publication of important historical documents, and by his own writings and lectures, he did much to extend a taste for historical studies in France. In 1837, he was intrusted by the government of the United States with the task of writing a history of Washington. His work *Vie, Correspondance, et Écrits de Washington* (2 vols., Paris 1839–40), procured him the honor of having his portrait placed in the Chamber of Representatives at Washington. After the February revolution, Guizot published several political treatises, more or less important; among them were *Révolution d'Angleterre*, and *Monk, Chute de la Republique*. He likewise wrote *Méditations et Études Morales sur la Religion, la Philosophie, etc.* (1852); *Corneille et son Temps* (1852); *Shakspeare et son Temps* (1852); In 1858, appeared his *Mémoires pour servir à l'Histoire de mon Temps*. His publication, 1861, defending the temporal power of the pope, was a strange one for a Protestant. Among the most important of his later works are *Méditations sur l'Etat Actuel de la Religion Chrétienne* (1865); *Mélanges Biographiques et Littéraires* (1868); *Mélanges Politiques et Historiques* (1869), etc. After his death was published *L'Histoire de France, racontée à mes Petits-Enfants*. Guizot was thrice married; his first two wives were accomplished women, and not unknown in literature.

GUIZO'TIA. See RAM-TIL.

GUJARAT. See GUZERAT.

GULA, n. *gū'lă*, or GOLA, n. *gō'lă* [L. *gula;* It. *gola*, the throat]: the alternate convex and concave parts of the molding of a cornice; the cyma.

GULCH, v. *gŭlch* [Dan. *gulpe*, to disgorge, to vomit; an imitation of the sound made in swallowing a liquid (see GULP)]: in *OE.*, to swallow voraciously: N. a glutton. GULCH'ING imp. GULCHED, pp. *gulcht*.

GULCH, n. *gŭlch* [see GULCH I, and GULP]: in *OE.*, a gully or swallow in a river; in *s. Africa*, a short ravine; a short deep bit of a torrent's bed when dry; a miniature cañon.

GUL'DEN. See FLORIN.

GULES, n. plu. *gulez* [Fr. *gueules*, the mouth and throat, hence red. Other origins are given, such as the Persian *ghul*, a rose or rose color, which seems more probable than the Hebrew *gulude*, a piece of red cloth, from which Mackenzie derives it; it being scarcely likely that it came from a Semitic source]: in heraldry a term denoting red; in engraving, it is marked by perpendicular lines traced from the top of the shield to the bottom; see HERALDRY. It is supposed to indicate valor, magnanimity, and the like, and is regarded as the most honorable heraldic color.

GULF, n. *gŭlf* [F. *golfe*, a whirlpool, a gulf—from It. *golfo*, an arm of the sea: Dut. *gulpen*, to swallow]: a tract of ocean water extending into the land; an arm of the sea; an abyss; a deep place in the earth; anything insatiable.

GULFPORT, Miss., city in Harrison County, on the Gulf of Mexico, and the Gulf & Ship Island and the Louisville and N. R.R's. Gulfport has grown in 5 years from a seacoast hamlet to a thriving city. The keynote of its success is the fact that it has one of the best harbors on the Gulf of Mexico. Prominent among its public buildings is the 'Great Southern' hotel, with its 250 rooms, intended as a winter resort for Northerners and as a summer resort for the people of the South, especially those of New Orleans. It is situated directly on the shore and is one of the finest resort hotels between Tampa and New Orleans. Other prominent buildings are the county court-house and those of the First National bank and of the Gulf and Ship Island railroad. The latter is used for the offices of the company. The First National bank is now the largest bank in the State of Mississippi, having a capital of $250,000. The most important manufacturing plants are oil and fertilizer factories, the Gulfport Packing Company and the shops of the Gulf & Ship Island railroad. There are, also, numerous smaller concerns, such as iron foundries and wood-working plants. Pop. (1910) 6,386.

GULF STREAM—O'CEAN-CURRENTS: vast and continuous drifts or streams of portions of oceanic waters —the Gulf stream being most important and best known. It derives its name from the Gulf of Mexico, out of which it flows, between the coast of Florida on one side, and Cuba and the Bahama Islands and shoals

on the other. With a breadth of about 50 m. in its narrowest portion, it has a velocity at times of five m. an hour, pouring along like an immense torrent. This great ocean-river flows n.e. along the American coast, gradually widening its current and diminishing in velocity, until it reaches the island and Banks of Newfoundland, when it sweeps across the Atlantic, and divides into two portions, one of which turns e. toward the Azores and coast of Morocco, while the other laves the shores of the British Islands and Norway, and can be perceived on the s. borders of Iceland and Spitzbergen, nearly as far e. as Nova Zembla.

The waters of the Gulf Stream are of deep indigo blue, with boundaries sharply defined against the light green of the seas through which it passes in its early course. It abounds with masses of sea-weed torn from the coral rocks of the strait through which it passes when it has its greatest power and velocity; while in its warm current may be seen myriads of fish and of animalculæ. As this great stream pours out of the Gulf of Mexico, it has a warmth of 84° in summer, being 4° higher than that of the ocean at the equator. In mid-Atlantic, opposite Nova Scotia, it has fallen at all seasons only about 14°; while the British Islands and n.w. coasts of Europe, at a distance of 4,000 m. from the Gulf, are bathed with waters heated under a tropical sun, and have their temperatures raised in winter about 30° above the normal temperature of the latitudes. In mid-winter, off the inclement coasts of N. America, between Cape Hatteras and Newfoundland, ships beaten back from their harbors by fierce north-westers, until loaded down with ice and in danger of foundering, turn their prows to the east, and seek relief and comfort in the Gulf Stream. A bank of fog rising like a wall, caused by the condensation of warm vapors meeting a colder atmosphere, marks the edge of the stream. The water suddenly changes from green to blue, the climate from winter to summer; and this change is so sudden that when a ship is crossing the line, it is declared that a difference of 30° of temperature has been marked between the bow and the stern.

The great differences of temperature between the w. shores of Europe and the e. shores of America have been attributed, too largely, perhaps, to the influence of the Gulf Stream. There is no doubt that such an immense body of heated water in the n.e. Atlantic must raise the temperature of the atmosphere, and that to this importation of the effects of tropical sunshine by sea is due, to a certain extent, Ireland's perpetual green, the soft moist climate of England and Scotland, and the fact that the harbors of the western and northern coasts of Norway, as far east as Varanger Fjord, remain open, when the Baltic, much further south, is a sheet of ice. England, clothed in perennial verdure,

and Scotland, where the grass grows during eleven months of the year, are in the same latitude as the frozen and repulsive coast of Labrador. Norway is opposite Greenland; and Lisbon, where frost is scarcely known, is in the same latitude as Washington, where the Potomac river, a mile in breadth, sometimes freezes over in a single night. This difference is to be ascribed not to the Gulf Stream alone, but to that in conjunction with the prevailing s.w. winds. The Mediterranean, exposed to no cold currents from the arctic regions bearing bergs and fields of ice, is a constant receiver and distributer of heat, and modifies the temperature of adjacent regions. North America, on the contrary, is exposed along its eastern shore to a great current from the Polar Seas, running inside and counter to the Gulf Stream, and coming loaded with ice from the northern regions; and while the continent narrows toward the tropics, it grows broad in the polar regions, from which come the cold north-westers, the prevailing winds during the wintry season.

The effect of the Gulf Stream on temperature has been nowhere more strikingly observed than in high northern latitudes. Where the warm stream from the s.w. meets the Arctic current in lat. of Iceland, a difference of 17° has been observed.

In treating of the cause or causes of the Gulf Stream, we must take a general view of ocean-currents. Taken altogether, they form a connected system aptly compared to the circulation of the blood. The two prime movers are differences of temperature and prevalent winds. Sea-water of average saltness does not freeze until it is cooled down to about 28°; and, unlike fresh water, it continues to grow heavier down to that point. The effect of the intense cold of the polar regions is thus to cause a constant sinking down of the surface-water, and to establish a current of ice cold water along the bottom toward the equator; while to supply the place of what sinks down, an in-draught or northward flow takes place on the surface, which brings the warm water of the temperate and tropical regions toward the poles. This is the general theory of the *vertical* circulation of the ocean—a circulation which might almost be assumed from the well-known laws of the flow of liquids, and which recent observations have established as a fact. The general prevalence of cold currents along the bed of the ocean from the poles to the equator is now beyond dispute. The soundings taken recently by H.M.S. *Challenger* show the temperature of the bottom water between Sombrero in the W. Indies and Teneriffe to vary from 34°·4 to 35°·5; while at the equator it is in some places still lower, being only 32°·4. This is held to prove that the Antarctic bottom current extends to the equator and beyond it. Motion once thus begun, however, is differently modified in each locality by the shape of the coasts, by prevalent winds, and other circumstances. But one cause which modifies all currents that tend either north or south, is the daily rotation of the earth. In the very same way that the rotation of the earth gives the trade-winds their peculiar

directions (see WINDS), it causes the cold currents coming from the poles to turn toward the southwest, and the surface-currents from the south to take a n.e. direction. At the equator, any spot on the surface is moving eastward at the rate of 1,000 m. an hour; at 60° north latitude, the velocity is only one half. Thus, the water of a current starting from the equator northward, is constantly coming to places where the bottom under it has less and less eastward velocity. But, by the law of inertia, the water tends to retain the same velocity eastward with which it started, and thus it moves to the e. of north—shooting ahead, as it were, of the bottom over which it is flowing, as a rider does whose horse slackens his pace. The contrary happens to a stream flowing from north to south. In this case, the eastward motion or motal inertia of the water is too slow for the parts of the bottom to which it successively comes; the bottom slips in a manner from under it, and it falls to w. of south. This, in combination with the action of opposing coasts, accounts for the circular sweep which many of the currents make, returning partly into themselves.

Different in origin from this vertical circulation, though partly connected with it, is the *horizontal* circulation caused by prevalent winds. The best example of this is the Equatorial Current, which sets from the w. coast of Africa to the e. coast of Brazil, and which is owing to the action of the trade-winds. Currents caused by winds are called 'drift-currents,' in opposition to the deeper seated 'stream-currents.' In order to feed this westerly equatorial current, there spring up two *in-draught* currents, which also follow the prevailing winds of their respective regions—one from the n. along the w. coast of Portugal and Morocco, the other from the Cape of Good Hope along the w. coast of Africa, as far as the Gulf of Guinea. When the equatorial current reaches the coast of Brazil, it divides into two branches. One proceeds southward turning gradually eastward across the Atlantic until it falls in with the northern in-draught from the Cape of Good Hope. The other branch is deflected northward into the Caribbean Sea and the Gulf of Mexico. The water thus driven into this pent-up sea then rushes out with accumulated momentum through the strait or gulf between Florida and the Bahamas, and forms the famous Gulf Stream.

It has usually been held that the Gulf Stream extends across the Atlantic to the shores of n. Europe, and is the cause of the mild and moist climate enjoyed by the western parts of that continent. The opinion, however, is beginning to prevail that, as a distinct current, the Gulf Stream ceases in the middle of the n. Atlantic, its waters being by this time thinned out to a mere film, and its initial velocity and distinctive heat having been dissipated. That warm waters from tropical seas are brought to the coasts of Britain, and even into the polar seas beyond, is proved by drift-wood, seeds, and fruits from the W. Indies being frequently cast ashore on the Hebrides, the n. of Norway, and Spitzbergen. But this is accounted for by the general flow

of the surface-water toward the poles, forming part of the vertical oceanic circulation; a flow which receives an eastward deflection as it proceeds northward, in the way above explained. This general set of the surface-water is further promoted by the prevalence of s.w. winds, which maintain a nearly constant n.e. *drift* over the whole surface of the n.e. portion of the Atlantic. In this way, though the Gulf Stream may have lost its original impetus, a large portion of the super-heated water which it brings into the centre of the Atlantic is carried to the shores of Europe and into the Arctic Sea.

The Pacific Ocean also has its great equatorial or trade-wind current, but there is no great basin like the Gulf of Mexico to gather the waters of another Gulf Stream. A portion of the equatorial current passes northward along the shores of China and Japan; a portion passes through the narrow channels of the Indian seas, and another portion turns southward toward Australia and New Zealand, affecting, doubtless, the isothermal lines in those latitudes, and returning in counter currents to Cape Horn, and even passing around it into the Atlantic. While thus a portion of the great counter or Polar current of the South Pacific sweeps around Cape Horn, another portion passes up the w. coast of S. America across the equator to 5° n. lat.; and its coolness is sensibly felt, and was carefully observed by Baron Humboldt on the coast of Peru. The currents in the waters between the Pacific and Indian oceans also are variously affected by the monsoons, and in some places run six months in one direction, and six months in the opposite, clearly proving that they are dependent mainly on the direction and force of the winds. A chart of ocean currents was published by the British Admiralty 1872, which proves beyond a doubt that an explanation of ocean currents must be sought almost wholly in the prevailing winds.

At first sight, it appears incredible that a current of water should force its way through the ocean with sharply defined boundaries, and a peculiar color, temperature, and inhabitants, like a great river flowing between its banks, for thousands of miles, and against the force of counter currents, which even cross its course, passing under by their superior density, until it loses its momentum on the shores of distant continents, or spreads out its warm flood on the bosom of northern seas. But a closer observation will satisfy us that all this is in accordance with the laws of hydrodynamics. At the confluence of the clear waters of the Mississippi with the turbid current of the Missouri, the two rivers do not at once unite, but run side by side with a sharply defined boundary between them for many a league. So great rivers running into the ocean, are rivers still, far out at sea. The current of the Rio de la Plata, which drains the southern portion of S. America, can be perceived 200 m. from land; and the Amazon sweeps far into the Atlantic, though gradually bent northwardly by the great trade-wind current, and then carried along the coast, to help, with the Orinoco, to swell the waters of the Gulf of Mexico; so that the

waters of the Amazon, the Orinoco, the Rio Grande, and the Mississippi, all join to swell the Gulf Stream.

The channel of the Gulf Stream in its narrower portion is of great depth. From observations made by the *Challenger* 1873, in that part of the stream between Bermuda and New York, it is seen the Gulf Stream is there about 100 fathoms deep, and 80 m. wide. The probability of its having hollowed out for itself a well-defined channel like the bed of a river, is shown by a sudden increase of depth at its border, where deep-sea soundings have been made; though so little can be known of the effect of currents upon a line of 20,000 ft. in length, and which requires several hours to run off the reel, that implicit reliance cannot be placed on such observations.

More important observations on the courses and influence of these currents have been lately undertaken by dropping bottles containing the date, latitude, and longitude, in all parts of the ocean. These bottles, when found upon a coast thousands of miles distant, give some indication of the direction and velocity of the currents that have brought them; but such testimony is not infallible. The bottle may be impeded by contrary winds, blown into counter-currents, or whirled about for months in eddies. A bottle thrown overboard in the Indian Ocean might reach the island of Spitzbergen, *viâ* the Gulf of Mexico; but there are many chances that it would be thrown out of the regular current, and be picked up on the shores of New Zealand or the coast of Peru. See Dr. Franklin's *Maritime Observations*, Pownall's *Hydraulic and Nautical Observations*, Humboldt's *Atlas Geographique et Physique*, Johnston's *Physical Atlas*, Maury's *Physical Geography of the Seas, and Wind and Current Charts*, and Admiralty wind and current charts for Pacific, Atlantic, and Indian oceans.

GULFWEED (*Sargassum*): genus of sea-weeds (*Algæ*) of the sub-order *Fucaceæ*, of which two species (*S. vulgare* and *S. bacciferum*) are found floating in immense quantities in some parts of the Atlantic, Pacific, and Indian oceans. They are tropical plants, though sometimes carried by winds and currents to the northern coasts. The frond is very long, and is furnished with distinct, stalked, nerved leaves, and simple axillary stalked air-vessels. The receptacles are linear, in small axillary clusters or racemes. The trivial name *bacciferum* applied to one of the species, is derived from the berry-like appearance of the air-vessels. The G. has been found only floating, but there is reason to think it is at first attached to the bottom of comparatively shallow parts of the sea. It floats in large fields, or more frequently in long yellow lines in the direction of the wind. In crossing the Atlantic, its presence is regarded as a sure indication of the Gulf Stream, by which it is wafted northward and eastward. Where the Gulf Stream is deflected from the banks of Newfoundland eastward, and sends off its more southern branch toward the Azores, is situated the *Sargasso Sea* 'that great bank of weeds, which so vividly occupied the imagination of Christopher Columbus, and which Oviedo calls the sea-weed meadows' (*Humboldt*).

The quantity of floating sea-weed is often such as to impede the progress of ships. Multitudes of small marine animals accompany it, with fishes ready to prey on them.—The Gulfweed is eaten in China; and in other parts of the East also, it is used in salads and as a pickle.

GULIELMA, *gū-lĭ-ĕl′ma:* genus of S. American palms, with pinnate leaves (entire in young plants), natives of the lower mountain-ranges of Peru and New Granada. One species, *G. speciosa*, is much planted by the Indians of the Amazon district and of Guiana and Venezuela, near their villages, and supplies them with food and other necessaries. It is often 60 ft. high, having an erect slender stem, encircled with many rings of needle-like spines, and numerous drooping leaves forming a nearly spherical crown. It is variously called *Papunha*, *Paripou*, etc., and sometimes *Peach Palm*.

GULL, v. *gŭl* [Dan. *guul;* Sw. *gul*, yellow—from the yellow color of the down or beak of a young bird: comp. Gael. *gall*, a Lowlander, a Saxon, a foreigner]: to cheat; to deceive; to defraud: N. a cheat; a trick; one easily cheated. GUL′LING, imp. GULLED, pp. *gŭld.* GUL′LIBLE, a. *-lĭ-bl*, easily deceived. GUL′LIBIL′ITY, n. *-bĭl′ĭ-tĭ*, the state or condition of being easily cheated or defrauded.

GULL, n. *gŭl* [W. *gwylan;* Bret. *gwelan*, from the peculiar wailing cry of the bird: Bret. *gwela*, to weep: It *gulone*], (*Larus*): genus of web-footed birds, of the family *Laridæ* (q.v.), inhabitants of the sea-coasts of all countries. The bill is strongly hooked at the tip and lacks a cere; the tail is usually square across the tip. The feet have three toes in front completely united by a web, and a small hind-toe not included in the web, and sometimes altogether wanting. The wings are long and pointed. Gulls have great power of wing, and fly apparently with ease against a storm, during the continuance of which they generally fly low, whether over sea or land, but in fine weather soar higher in the air, in which they seem to delight in performing the most varied and beautiful evolutions. They descend with great rapidity to seize prey from the surface of the water or at a small depth; but they are not good divers, and the fishes which they catch are chiefly those which, like the herring and others of the same family, swim near the surface. They are very voracious. Their food consists of almost anything animal. Many are wholly or partially migratory, breeding in colder regions than those which they inhabit in winter. In general, they lay only two or three eggs, which are large for the size of the bird.

Many of the gulls are frequent visitors of inland districts, ascending rivers, and hovering over them in quest of prey as over the sea. Some also are often seen in meadows and plowed fields, seeking for worms and other such food. It is a common notion in Britain that the

appearance of gulls in inland districts betokens stormy weather. But in America, the migrations of some of the species between the northern seas and the Gulf of Mexico are performed, not only along the Atlantic coast, but by the great lakes and the valleys of the Ohio and the Mississippi, and a few occasionally remain and breed near these inland waters. Large flocks of a species of gull (*L. serranus*) frequent the lakes of the high table-lands of Peru.

Some at least of the larger gulls break the shells of mollusks by taking them up to a sufficient height in the air, and dropping them on a rock. This interesting fact is attested by Audubon, the American ornithologist, as having come under his own observation, and he mentions an instance in which a gull, finding the shell not broken by the fall, carried it up a second and a third time, and each time higher than the former.

The flesh of gulls is rather coarse, but that of the young is in request on many northern coasts as an article of food, and is salted for winter use. The eggs of certain species such as the Black-headed Gull, are said to be very palatable, and are collected in great quantities in some places where these birds breed in large numbers.

The plumage of gulls is generally in great part white, variously mixed with gray, slate-color, brown, and black. The white, in some species, assumes a rosy tint in the breeding season; and the head of some becomes black. The differences of plumage, according to age and season and sex, are considerable, and have led to many errors as to species.

Among common American species is the HERRING GULL (*L. argentatus*), a large bird, frequent on rocky coasts; the KITTIWAKE (*L. tridactylus* or *L. rissa*), about 15 inches in length, gray and white, destitute of hind-toe; it is plentiful where the coast is girt with rocky precipices, on the narrow ledges of which it makes its nest; in Britain its young and eggs are among chief objects of pursuit of the rock-fowlers; and the GREAT BLACK-BACKED GULL or WAGEL (*L. marinus*), nearly 30 inches long. In Britain the GLAUCOUS GULL or BURGOMASTER (*L. glaucus*), is common as a winter visitant from arctic regions; scarcely inferior in size to the Great Black-Backed, and by some supposed to be identical with it; it is of pale bluish-gray color above, and white below. This species seems to have acquired its name of Burgomaster from the superiority which, in virtue of its size and strength, it asserts over most of the smaller birds of the northern seas, compelling them to relinquish prey at its approach. The COMMON AMERICAN GULL (*L. zonorhynchus*) is not found on the eastern shores of the Atlantic.

GULLET, n. *gŭl'lĕt* [F. *goulet*, the gullet—from *goule*, the mouth: Bav. *güllen;* Swiss, *gülle*, a sink: L. *gula*,

the throat or gullet]: the passage in the neck and chest of an animal down which food and drink pass into the stomach; the œsophagus: see ŒSOPHAGUS. GULLY, n. *gŭl'lĭ* [F. *goulotte*]: a channel or hollow formed by running water; a ditch; a gutter. GUL'LIED, a. *-lĭd*, having a hollow worn by water. GULLY-HOLE, the mouth of a drain where the water pours with a gurgling noise into the sink or the main sewer.

GULLY. See under GULLET.

GULLY, n. or GULLEY, n. or GULLIE, n. *gŭl'lĭ* [W. *gyllell*, a knife, *gylyf*, a sickle: comp. L. *gula*, the windpipe]: in *Scot.* and *prov. Eng.*, a large clasp-knife.

GULP, v. *gŭlp* [Dut. *golpen*, to drink greedily: Dan. *gulpe;* Norw. *gulka*, to gulp up]: to swallow eagerly or in large draughts: N. as much as can be swallowed at once. GULP'ING, imp. GULPED, pp. *gŭlpt*.

GULUNCHA, *gŭ-lŭn'cha* (*Cocculus cordifolius*): plant of the same genus which yields Calumba (q.v.), extensively used in the E. Indies as a tonic and febrifuge. It is largely cultivated in some parts. It is a climber, with heart-shaped leaves. It has wonderful tenacity of life. When it has acquired the diameter of half an inch, it is not unusual to cut from the main stem a portion 20 to 30 ft. in length, when the part sustained by the branches of the tree sends down threads to the ground, which take root, and become new stems. To plant it, a few yards of the stem are merely made into a coil, and hung on the branch of a tree (Tennent's *Ceylon*).

GUM, n. *gŭm* [Fr. *gomme;* L. *gummi;* Gr. *kommi*, gum: Lang. *goumo*, sap]: a vegetable mucilage or glue, found thickened on the surface of certain trees: V. to smear with gum; to unite with gum. GUM'MING, imp. GUMMED, pp. *gŭmd:* ADJ. covered or smeared with gum. GUMMIC, a. *gŭm'mĭk*, of or pertaining to gum. GUMMIF'EROUS [L. *fero*, I carry]: bearing or producing gum. GUM'MOUS, a. *-mŭs*, of the nature or quality of gum. GUM'MY, a. *-mĭ*, adhesive; consisting of or resembling gum; formerly in *familiar slang*, thick; clumsy; puffy. GUM'MINESS, n. GUM-LAC, *-lăk*, resinous substance exuded from the body of certain insects, chiefly upon the banyan-tree; the *Aleurītēs laccif'ĕră*, ord. *Euphorbĭācĕœ*, furnishes gum-lac in Ceylon. GUMMIC ACID, an acid formed from gum. BRITISH GUM or DEXTRINE (see both these titles). GUM-TREE, species of *Eucalyptus:* see EUCALYPTUS: TUPELO.

GUM, n. *gŭm* [Dut. *gumme;* Germ. *gaumen*, the palate: prov. Sw. *gummsa*, to chew with difficulty and slowly]: fleshy matter surrounding a tooth; the sockets of the teeth. GUM-BOIL, a boil on the gum. It is an abscess near the root of a tooth, discharging itself toward the mucous membrane of the gum; usually superficial, but sometimes more deeply seated in connection with the bone, and causing considerable deformity,

with risk of Caries (q.v.) or Necrosis (q.v.). Gum-boil should be treated in the first instance, by simple protection against external injury; but as soon as the presence of matter can be ascertained, it is usually good practice to give vent to it by a free incision.

GUM ARABIC, a gum of the *Acacia arabica*, which grows in India and Arabia. Gum arabic can be obtained also from *Vachellia farnesiana* of India, a small tree closely allied to the true acacias. Gum arabic occurs in transparent white tears, which are often colored yellow or brown by impurities; it cracks on exposure to the air on the surface; it is brittle, and has a bland, mucilaginous taste. It dissolves in water, and the solution gives a precipitate of arabin on the addition of hydrochloric acid. Gum arabic contains about 70 per cent. of arabin, $2C_6H_{10}O_5 + H_2O$, and 17 per cent. of water; the rest consists of potash and lime, which are combined with the arabin.

GUM'BO, or GOR'BO or GOB'BO. See HIBISCUS.

GUMMING. The tendency of lubricating oils to become thick and sticky.

GUM'MING: disease analogous to *Canker* (q.v.), and like it, very destructive to fruit-trees, but confined to those the sap of which readily produces much gum; as the cherry, plum, peach, apricot, and almond. It is supposed sometimes to originate in wounds, in which a morbid exudation of gum takes place; but it appears more frequently occasioned by severe frosts, and to be much dependent on causes which induce a general unhealthiness. It generally terminates in the destruction, not merely of the branch in which it originated, but of the whole tree, though trees in which it is in sure progress sometimes live for years, and meanwhile produce large crops of fruit. A small fungus (*Næmaspora crocea*), often supposed to be the cause of gumming, is more probably in consequence.

GUM-RESINS are complex mixtures obtained from plants. They contain both a gum, which is soluble in water, and a resin, which dissolves in spirit. There are usually present in addition essential oil, coloring and extractive matter, and a variety of impurities. The gum-resins have frequently a strong and characteristic taste and smell. They are solid, opaque and brittle. The common gum-resins are aloes, ammoniacum, asafœtida, euphorbium, galbanum, gamboge, myrrh, olibanum, opoponax, sagapenum, and scammony.

GUMPTION, n. *gŭm'shŭn* [old and prov. Eng. *gaum*, to observe, to understand: AS. *geomian*, to take care of: comp. Gael. *cuimeasach*, moderate, temperate]: in *familiar language*, capacity; shrewdness; common-sense; tact.

GUMRI, *gôm'rē:* old town of Russian Armenia, on the site of which the important city and fortress of Alexandropol have been built. The latter name, in honor of

Empress Alexandra, is now the most frequent. The site is on the old Turkish frontier, on the high-road to Erivan, 60 m. n.w. of that town. Alexandropol in 5,860 ft. above sea-level, and here the cold is so intense that men are often frozen to death in the fields. Fortifications, erected 1837 by Nicholas I., rank next to Kars in strength in that part of Asia. Pop. 32,000.

GUMTI, *gôm'tē:* river of India, remarkable, as its name is meant to express, for its windings. It rises in a small lake, lat. 28° 35′ n., and long. 80° 10′ e., and after a s.e. course of 482 m., enters the Ganges from the left, lat. 25° 29′ n., and long. 83° 15′ e. It is navigable for inland craft as far up as Lucknow, more than 300 m. above its confluence with the Ganges. At Jaunpore, about 56 m. from the Ganges, it is spanned by a bridge of 16 arches.

GUN, n. *gŭn* [OE. *gonne;* mid. L. *gunna,* a war-engine, a fire-tube: comp. Gael. *gunna,* a weapon to project or discharge with]: any firearm, except a pistol and a revolver, a fowling-piece; an instrument for throwing shot by means of gunpowder, as a musket, a rifle, a cannon. GUN-BARREL, the tube of a gun. GUN'NER, n. *-nėr,* one appointed over guns or ammunition; an artilleryman. GUN'NERY, n. *-ĭ,* the art of managing guns, mortars, etc.; also the science. GUN-METAL, an alloy of nine parts of copper with one of tin. GUNPOWDER, n. *-pow'der,* the chemical composition used in guns, etc., composed of nitre, sulphur, and charcoal. GUN'SHOT, a. caused by the shot from a gun, as a wound: N. reach or range of a gun. GUNSMITH, n. one who makes or repairs guns. GUN'-STOCK, n. the wood into which the barrel of a fowling-piece, musket, or rifle is fitted. GUN-TACKLE, *-tăk'l,* pulleys and ropes used on board of ships to secure guns, or to run them out of the ports. GUNWALE, n. *gŭn'ĕl* [*gun,* and *wale,* which see]: the upper timber of a ship's side from the half-deck to the forecastle—so named because the upper guns were pointed from it—spelled also GUN'-NEL. A GREAT GUN, a man of eminence and mark, especially as a preacher or public speaker. AIR-GUN: see AIR-GUN.

GUN, n. [O.E. *gonne, gunne.* Origin unknown]: a name commonly applied to-day to all classes of firearms.

The word was used long before the invention of gunpowder to designate engines of the *catapult* and *ballista* type, using the lever or sling, by means of which large stones, darts and other missiles were thrown.

The arbalest, or cross-bow, was also used for military purposes. The blow-gun, a simple reed tube, is still in use by the Malay tribes. In recent years United States troops in the Philippine Islands have frequently found these weapons in the hands of some of the more savage inhabitants of the interior. The mouth is applied to one end, and by the air expelled, the missle is projected to considerable distances. From these weapons poisoned

arrows or darts are shot and are very deadly. They make no noise—the shooter being concealed in a tree or other favorable position.

The pneumatic or air gun is a familiar weapon. Some years ago heavy pneumatic-guns were mounted in some of the defenses of the United States. These weapons hurled, by action of compressed air, large projectiles filled with high explosives. They have since, however, been abandoned. Ex. Zalinski, Sims-Dudley.

General Classification.—Guns, in general, may be subdivided into (1) Portable or Small Arms, which include all kinds of guns carried by the individual, and fired from the shoulder or hand, as rifles, carbines, muskets, shotguns, pistols, etc.; (2) Cannon, or Heavy Ordnance, including those guns fired from gun-carriages, pedestal or other mounts, and embracing those of the largest size and heaviest calibres.

In military works, all guns, as well as cutting or thrusting arms, are included under the general term of Ordnance. Guns also may be classed as muzzle-loading or breech-loading, although the former are practically no longer manufactured for military or sporting use, and may be considered as belonging to the curio class of arms.

History and Description of Small Arms.—From the earliest history of man attempts have been made to devise weapons that would kill or disable an enemy at a distance. Slings, javelins, lances, and other weapons were used as far back as history records. The bow and arrow, and cross-bow, were invented, thus preventing danger from hand-to-hand conflict.

Small arms using powder, did not make their appearance until the 14th century, when they began to replace the earlier weapons. Slow progress, however, was made in their development, and a great deal of prejudice was shown against their use which, no doubt, had a retarding effect.

Rel gious councils considered even the arbalest—which, in the more powerful types, penetrated the armor of knights—as murderous and 'only fit to use against infidels.' Knights denounced them as they did the later firearms 'as only fit for the use of cowards who dreaded the hand-to-hand conflict where true valor was displayed.'

The first gun consisted of a tube with a vent, or touch-hole, provided with a straight stock. This was used by both foot and mounted troops. In firing, the stock was held under the arm, suppported by a rest, or by mounted troops against the breast, a rest sometimes being attached to the saddle. It was fired by applying a match to the vent which was placed on top. Later a pan was attached to the side where the vent was also located, and a cock was added to which a match was attached and adjusted by hand. This match fired the powder placed in the pan, the flame being communicated to the charge and discharging the piece. This was further improved by the wheel-lock, which acted on the same

principle, the sulphuret of iron, or iron pyrites, being used instead of the match. This weapon was called the *Arquebuse à mèche*, or *Harquebus* (Fig. 1).

The well-known flint-lock next made its appearance. In this weapon a flint was attached to the cock which, in falling on the steel covering of the pan, generated sparks which in turn ignited the powder and discharged

Fig. 1.

the weapon. This weapon was adopted for military purposes in 1630. (Fig. 2.)

The earlier forms of the musket were necessarily cumbersome and were of a very large calibre, using balls from 10 to 12 to the lb., corresponding in bore to the 10 and 12 gauge shotguns of the present day. In addition to the musket the soldier carried a dagger, which was afterwards fitted to the muzzle and served in the same way as the present bayonet.

Fig. 2.

The bayonet, invented at Bayonne, France, from which it takes its name, appeared in the 17th century.

The development of firearms was very slow until the 19th century. The flint-lock gave way to the percussion-cap and nipple, an invention of Joshua Shaw, an American, which greatly added to the effectiveness of the weapon. Rifling was devised in the 16th century, increasing the accuracy and range. Various improved forms of bullets

added to its effectiveness, the Minié ball, named after its inventor, among others. Numerous changes took place in the twist of the rifling, etc., from time to time, but it remained for the change from the muzzle-loader to the breech-loader to revolutionize the musket and change military dispositions on the field of battle.

Breech-loaders of various forms appeared long before a reliable weapon was invented. The principle was well known and many models of old breech-loaders, of both musket and pistol, are still in existence. The illustration, Fig. 3, shows one in the tower of London said to have

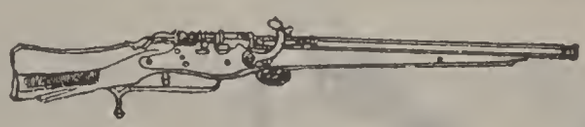


Fig. 3.

been used by Henry VIII., in 1537; Fig. 4. shows an Italian made pistol, used in the 16th century. Various other models are in existence.

Aware of the great importance of a breech-loader, Napoleon Bonaparte offered a reward to Colonel Pauly, a locksmith of Paris, to invent a breech-loading musket. A weapon invented by him is said to have been produced on the model of the Needle-gun.

The Hall gun, breech-loader, was adopted in the United States in 1813, and used by U. S. troops in the Creek,

Fig. 4.

Seminole, and Black Hawk wars. In the war of the rebellion breech-loading rifles and carbines aggregating a quarter million stands were placed in the hands of troops. The credit, however, is due to a German gunsmith, Dreyse, a pupil of Pauly of Paris, of inventing the first effective breech-loader, in 1835. It is claimed, nevertheless, that the principle of his gun was the same as that of Pauly's. This gun was adopted by the Prussian government in 1841 and was used by the Prussians in the war against Denmark, but became famous in the Seven Weeks War against Austria in 1866. It was used

with terrific effect in the decisive battle of Königrätz, where the success of the Prussians was due to its superior qualities.

The development of the breech-loader made rapid progress from this date. All military nations of the world hastened to arm and equip their troops with breech-loading arms.

The first breech-loaders were single-shot guns, but the demand for a more rapid fire gun produced the magazine rifle. The great aim has been to devise a gun with the greatest accuracy, rapidity of fire and range, together with strength and serviceability.

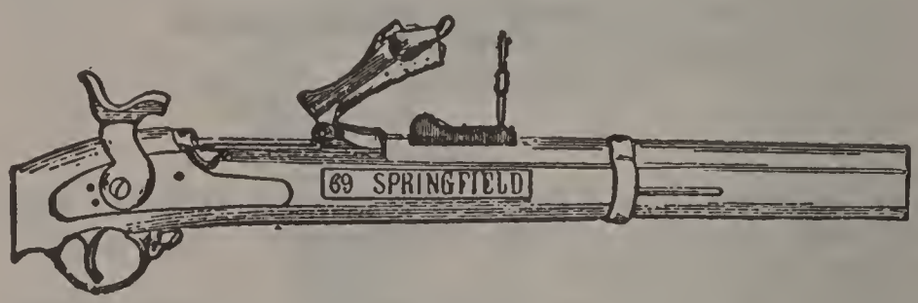


Fig. 5.

Breech-loading mechanisms are classified into two systems: (1) The Rotating System; (2) The Sliding System.

The Rotating System was employed in the manufacture of the Springfield rifle, the breech-block rotating on an axis at right angles to the axis of the piece. While this action gave excellent results in its time, it is now obsolete, as from its mechanism it is evident that the chamber cannot be tightly closed, although simple and excellent in other respects. See Fig. 5

The Sliding System is generally adopted for all high class military and sporting rifles, as better adapted to

Fig. 6.

magazine rifles than any other system, being simple, strong and safe, the block sliding in the direction of the axis of the barrel. In the Sharp and Krupp designs, however, which are forms of the Sliding System, the block moves at right angles to the axis of the barrel. An example of the Sliding System is the U. S. Magazine Rifle, model 1903. (See Figs. 6 and 7.) The barrel is 24.206 inches long, with four plain rifling grooves .004 of an inch deep. The twist is uniform, one turn in ten inches.

The breech mechanism is illustrated in Figs. 8 and 9, the parts being plainly marked thereon.

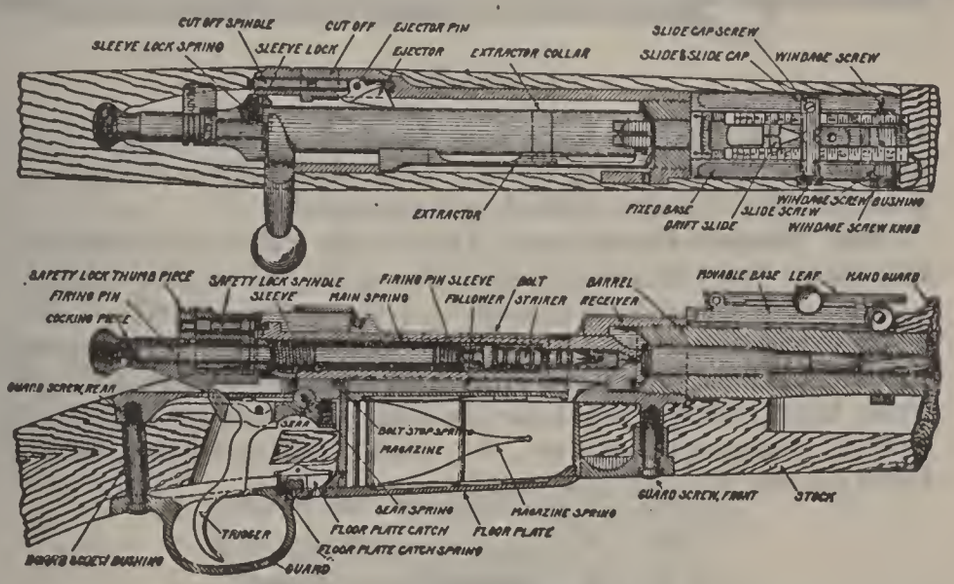
It is a bolt-gun and represents the latest high power

military rifle. It may be used as magazine and also as single loader, a cut-off being provided to shut off the magazine when it is to be used as a single loader.

This rifle, like all of the best modern guns, is loaded by means of a clip (see Fig. 10) in which five cartridges

Fig. 7.

are placed. These cartridges fit in a groove and are held securely in position by a spring. In loading, the clip, charged, is adjusted to position and the cartridges forced into the magazine by a single motion of the thumb, the



Figs. 8 and 9.

clip falling to the ground. The breech is then closed, and the piece is ready for firing.

The average charge is 42 grains of powder which gives the bullet, weighing 220 grains, a muzzle velocity of

Fig. 10. Body A, spring B stop lugs C catch D, interlocking lips E.

2,200 feet. Sixty ball cartridges, in twelve clips, are packed in one bandoleer, which may be carried over the shoulder. As many of these bandoleers may be carried in action as may be deemed necessary.

The maximum range of this rifle is 4,247 yards, a distance of over two and one-third miles. With the increased charge of the improved service cartridge a muzzle velocity of 2,300 feet is obtained, which will give an increased range.

Twenty-three aimed shots, as a single loader, and twenty-five using the magazine, have been fired by this gun in one minute. Figs. 11 and 12 represent the latest bayonet used on this arm, showing the blade and scabbard.

Among the magazine rifles produced from time to time, representing different systems and worthy of note, is the

Figs. 11 and 12.

Lee, model 1882, which was loaded by inserting a detachable central magazine. (See Fig. 13.) This gun was adopted by the British government.

The Chaffee-Reece and Hotchkiss rifles appeared in the same year, the magazines being placed in the stock.

The well-known Winchester rifle, represented in Fig. 14 is world famous as a sporting rifle, the magazine being placed under the barrel. Different models of this rifle have been made from time to time, in some of which the central magazine system is used. Self-loading, or automatic models are also made.

Fig. 13.

Automatic Small Arms.—Automatic small arms have passed the experimental stage and are being perfected, on account of their special advantages, to replace the present arms used as military and sporting weapons. The Colt, Lüger and Mauser pistols have all been favorably tested, and are in use, in the United States.

For convenience in aiming, these pistols, however, have been so arranged as to be semi-automatic, that is, that the trigger is to be pulled for each shot, but may be fired as fast as the trigger can be pulled until the magazine is exhausted. Such pistols are operated by the force of the recoil, which gives a simple and effective action, as

the parts to be moved by this force are small. The power of such pistols is greater than that of the revolver because of the better confinement of the gas, and the accuracy is greatly increased as the parts move in the direction of the axis of the bore, and hence the pistol is not so disturbed in the action of firing.

To explain the automatic action it will be sufficient to describe that of the Colt automatic pistol, cal. 38. (See Fig. 15.) Some of these pistols have already been issued

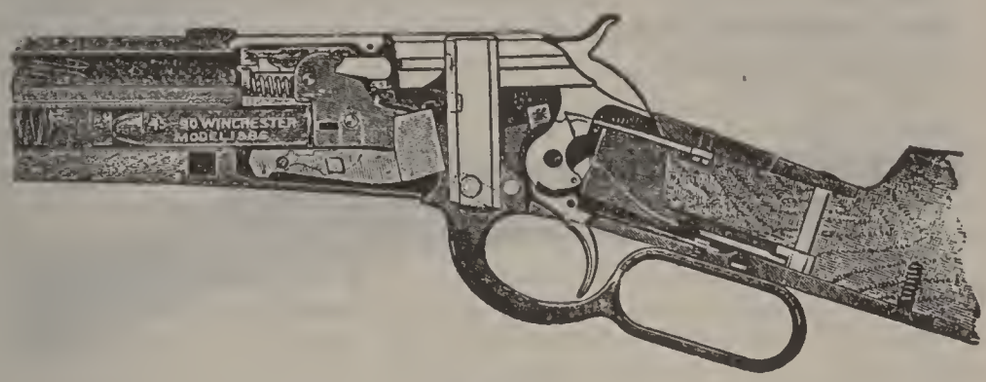


Fig. 14.

to U. S. troops. It consists of three principal parts: the frame *i*, which includes the handle *a*, magazine *c*, hammer *d*, trigger *e*, recoil spring *f*, spindle *g*, and cross slide *h;* the barrel *b*, is secured to the frame by two links *kk*, and the sliding cover *ll;* the rear solid portion *m*, serving as a breech-block. The sliding cover works in grooves on the sides of the frame, which are slotted near the front for the cross slide, which passes through the sliding cover and rests against the head of the spindle. In the firing

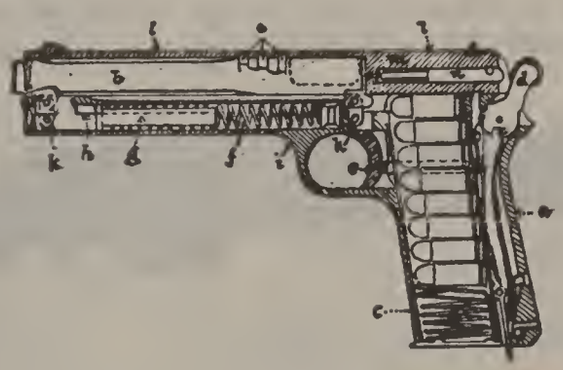


Fig. 15.

position three ribs *o*, on top of the barrel, fit in corresponding grooves in the slide thereby locking the breech-block to the barrel. When fired, the barrel and slide recoil together for .2 of an inch, when the barrel is rotated downward by the action of the two links and unlocked from the sliding cover, which continues to recoil, extracting the empty case, cocking the hammer and compressing the recoil spring. As the sliding cover moves forward again under the action of the recoil spring, a fresh cartridge is pushed into the chamber, and the last

part of the motion carries the barrel forward and upward, locking the barrel and cover for another shot. When the last cartridge is fired, the slide block is held back by a catch indicating that the magazine is empty. Devices for safety are provided to prevent premature or accidental discharge. This pistol fires a bullet weighing 130 grains, with a muzzle velocity of 1107 feet.

The Lüger and Mauser automatic pistols are also simple and effective in construction, and have given excellent results. Carbines of the same design, have also been manufactured and have proved effective and accurate weapons.

Fig. 16.

Automatic Rifles.—A number of automatic rifles and shot-guns have also been designed and are now in use. These are called *self-loading* small arms. They have given excellent results as sporting arms, but so far do not appear to have been adopted to any extent as a military arm. They are operated on the recoil system on the same principle as the pistol. Experiments are progressing to produce a weapon fulfilling the service requirements of a military arm. Such rifles are expected to result in a great gain in power as larger charges may be used. Greater accuracy may be obtained, as the

Fig. 17.

rifle will not have to be removed from the shoulder in firing, while at the decisive moment the greatly increased rapidity of fire will be a matter of great importance.

Among automatic rifles already in use the Winchester models of 1903 (Fig. 16) and that of 1905 (Fig. 17) may be cited.

The improvement in small arms is continuous. The rifle of to-day, doubtless, will shortly be replaced by one that is superior, and the soldier will be armed with a weapon that will be effective as far as the vision may extend, and capable of inflicting serious losses on troops at ranges now considered effective only for field artillery.

MACHINE GUNS.

A machine gun, as the name implies, is a gun worked by machinery in its loading and firing action, and generally uses small arms cartridges. They are used where they can pour a stream of bullets on masses of troops, batteries, etc. Great rapidity of fire is obtained in this class of guns. The well-known French *mitrailleuse* gun, used in the Franco-Prussian War of 1870–1, and the American Gatling gun, are early models.

Gatling Gun.—Briefly described, the Gatling gun consists of a number of breech-loading rifled barrels placed around a central shaft *KK*. (Fig. 18), held together by two plates *HJ*, thus forming a cylinder revolving around the central shaft and turned by the crank *F*. attached to it. The carrier block *G* is attached to the shaft with grooves which receive the cartridges from a feed belt and guide them into the barrels as they are pushed into them by bolts, also returning the empty shells after firing. A second cylinder *A* is also attached to the shaft *KK*, on which slide the bolts by which the breeches are opened and closed and the cartridges fired. The central shaft is

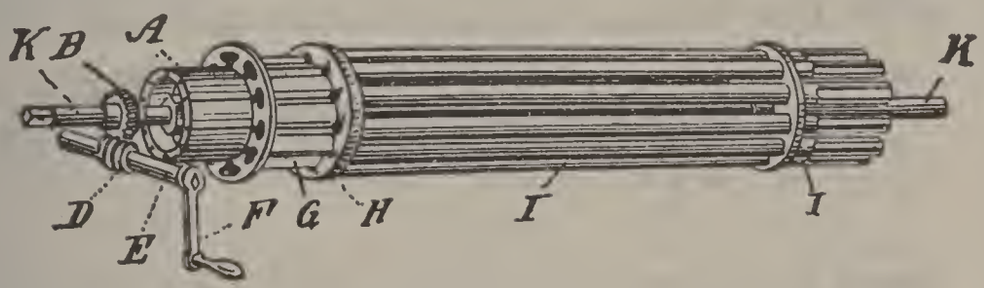


Fig. 18.

provided with a worm gear *B*, in which the worm *D* works by means of the transverse shaft *E*. The crank *F* is attached to this shaft and turns the central shaft barrels and carrier block. A frame of bronze, to which the shaft is fixed, covers it, with barrels and mechanism, from dust. This gun is mounted on a carriage, and fed by a belt adjusted to position ready for firing. By attaching the crank to the rear end of the shaft a rapid fire is obtained. From 800 to 1,200 shots have been fired from this gun in one minute.

Automatic Machine Guns.—In these guns the automatic action is obtained by the powder gases, the recoil being insufficient. They may be fired continuously as long as the finger is held on the trigger and the supply of ammunition in the belt lasts. These guns are, in fact, gas engines, the recoil being a spring and the bullet the admission valve. The gas acts either through a vent forward in the barrel before the bullet has left the muzzle, or may exhaust against a perforated piston plate in front of the muzzle after the bullet leaves the barrel. A combination of both the recoil and gas system has also been devised. These guns use the regular service cartridge, cal. 30.

The Colt and Maxim automatic machine guns are both

used in the United States service. An explanation and description of the Colt gun will suffice for this class of guns.

Colt Machine Gun (see Fig. 19).—This gun, which has a single barrel *a*, is operated by the powder gas. The barrel is attached to a breech casting *b*, which contains the mechanism. Ammunition is supplied by belts adjusted to the mount, and replaced when exhausted. The gas acts through a vent *c* in the barrel in rear of the muzzle, operating a piston *d*, which fits in a cylinder *e*, fitted to the vent and attached to the lever *f*, pivoted at *g* to the bracket band *h*, working vertically downwards against two springs *i*, through the short crank arm *k*, and the *T*-rod *l*, so as to keep the piston in the gas cylinder except when acted upon by the powder pressure. This lever is connected at *m* to a rod *n*, attached at *o* to a slide *p*, extending rearward under and beyond the barrel in grooves in the casing and working the breech-bolt *q*, with its extractor, the feed wheel mechanism *r*, and the carrier *s*. The breech-bolt moves backward and forward, opening and closing the breech; in the forward position, the rear end of the breech-block swings downward, turning on the front end as a fulcrum, and in this position is sus-

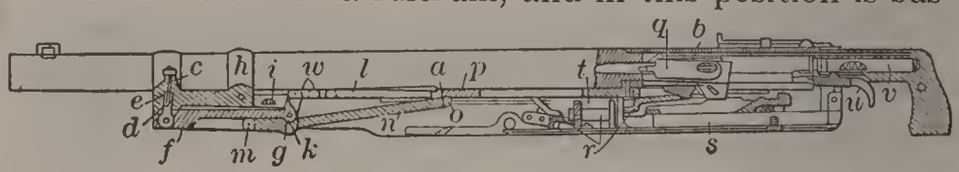


Fig. 19.

tained by its abutments in the receiver. In firing, the feed belt is entered at the opening *t*, the lever pulled once to the rear, preparing the piece for firing. On puling the trigger *u*, the hammer *v*, which is cocked by the rear motion of the bolt, moves forward and fires the cartridge. The breech is opened, the shell ejected, and another cartridge supplied by the feed *r* to the carrier *s*, and carried in front of the breech-bolt by the rear movement of the gas lever and connections by action of powder gases. The cartridge is forced home in the chamber of the barrel and the breech-bolt closed and locked by the forward movement of the gas lever and connections under the action of the springs. The same operation is repeated as long as the cartridges last by holding the trigger back; 480 shots can be fired in one minute. One man to fire the gun and one to attend to the belts are required to operate the gun. It is carried by the infantry and cavalry in the field on mules as the mountain gun, although carriages and limbers are provided also for field purposes and mounts for fortifications and for use on our warships. The gun weighs 40 lbs.

The Hotchkiss automatic machine gun is operated also by powder gas; the Vickers-Maxim gun by recoil and powder gas combined.

Water jackets are provided to prevent the over heating of machine guns during very rapid fire.

The Gardner Machine Gun.—The Gardner machine gun has two barrels with their axes parallel and in the same horizontal plane. Unlike the Gatling and Hotchkiss it has no motion. The loading and firing are done by the action of bolts and a firing mechanism operated by a crank turned by hand.

Hotchkiss Revolving Gun.—This gun fires a projectile of one pound. It is similar in principle to the Gatling gun but has five barrels assembled about a central shaft around which they revolve, but has only one loading, one firing, and one extracting apparatus for the five barrels, while the Gatling has one for each barrel.

Rapid Fire Guns.—Rapid or quick fire guns are distinguished from machine guns by a larger calibre, with generally one barrel, have artificial means for checking recoil and returning to the firing position, and are loaded by hand. They generally use *fixed ammunition*, or ammunition in metal cases, with the projectile attached the same as for small arms, and other arrangements to increase the rapidity of fire. They are made to include guns up to 4.7 inch calibre using *fixed ammunition.*

Larger calibres, with powder in metallic cases and projectiles separate, on account of their rapid fire, are also included in this class.

PISTOLS.

Pistols are that class of small arms that are fired from the hand. There are many well-known models of pistols, among which revolvers are classed, the Colt being the most prominent and widely known. This weapon is the invention of Col. Colt, an American, who may be called the father of the revolver. For many years it has formed a part of the small arm equipment of the U. S. Army and of the police, not only of this country, but of many foreign countries.

The revolver, which is a weapon generally used for personal defense at short distances, and principally employed by mounted troops, may be divided into three classes:—(1) Single action revolvers, or those which must be cocked by hand each time they are fired; (2) Self-cocking revolvers, in which the cocking and firing are accomplished by pulling the trigger; (3) Double action revolvers, which may be used both as single action and self-cocking pistols as may be desired.

Two calibres are used in the U. S. service, both of the Colt model, the one .38 and the other .45 in. cal., that principally in use now being the .38 cal. They are both six-shot weapons, simple of construction, and are sufficiently well explained in the illustration herewith. (See Fig. 20.)

Automatic pistols have been described under *automatic small arms.*

CANNON.—HISTORY AND DESCRIPTION.

The need of heavier arms than those of the portable kind was felt in the early military operations. Before

the invention of gunpowder the battering ram and machines operated by springs or levers, were used in the earliest sieges in making breaches in the walls of castles and other strong places. The most important of these were the ballista and catapult. The exact construction of these machines and, in fact, the difference between the two, appear to be a matter of doubt. They evidently consisted of a lever bent down under strong tension; to the extreme end a misslie or projectile was attached and on releasing the lever the missile was projected in the desired direction.

On account of the difficulties of their manufacture and transportation, the manufacture of cannon did not progress apace with that of small arms. In the 14th century history records the use of cannon or 'crakys' of war by the English against the French. Though the Chinese claim to have used these arms at a much earlier date. These weapons were very crude in construction,

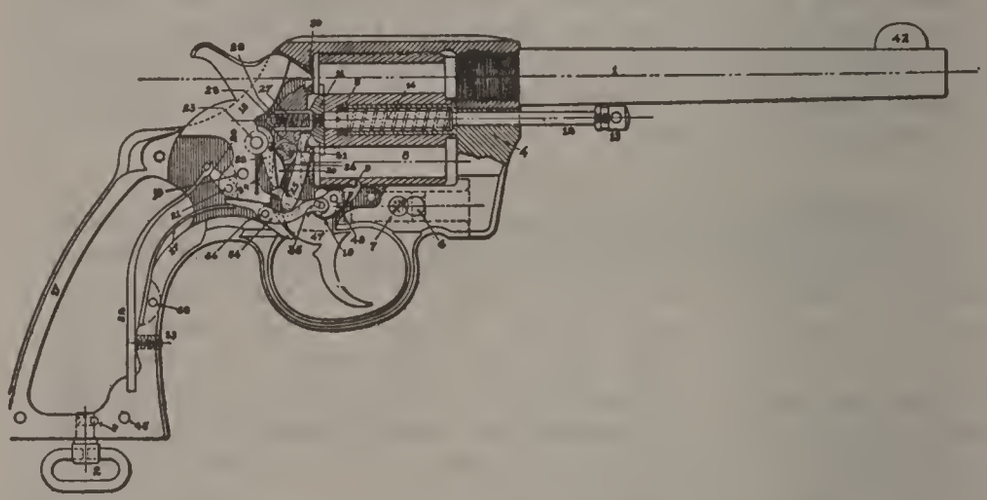


Fig. 20.

short, and in the form of bowls or mortars, from which fact the name of the modern mortar was taken. Staves, hooped with iron bands, were used to form these guns, the range of which was even less than the catapult or ballista. In the 15th century improvements were made and the length and power increased.

Bombards and culverins of large diameter were manufactured by casting, which threw projectiles up to several hundred pounds in weight with greatly increased effectiveness. Stone shot, used in their earlier models, were replaced later by those of iron. Brass and bronze were used in the construction of these guns. Later carriages were added, greatly facilitating the means of transportation. Such guns were first cast hollow, then solid, and afterwards bored. Efforts were made to make them as light as possible to further increase their mobility.

The field guns of Gustavus Adolphus of Sweden, to insure greater mobility, were made very light by using thin sheets of metal reinforced by hoops. While not

10-inch Breech-loading Rifle in firing position on Pneumatic Disappearing Carriage. The recoil forces it down on the carriage for reloading behind the parapet.

strong they were capable of quick movement on the field. Rapidity of fire was further increased by using a cartridge bag for the powder, made of canvas.

Garrison and coast artillery were provided with carriage mounts, those for the coast guns being pivoted in front and furnished with a traversing circle to facilitate aiming them. Carronades, manufactured at the Carron Foundry in Scotland, from which place they take their name, appeared, and grape, canister and hollow projectiles were added to solid shot.

The longer cast-iron 'Columbiad Gun,' invented by Colonel Bomford of the U. S. Army, was manufactured and used in the war of 1812.

In the war of the rebellion in 1861–5, the Parrot and Rodman cast-iron guns, both invented by officers of the U. S. Army, were manufactured and did excellent resvice. The 4.2-inch Parrot gun was a rifled gun consisting of a hollow cast-iron tube, and was strengthened by a jacket of wrought iron shrunk over the breech. The Rodman gun, the best of all cast-iron smooth-bore guns, was made of the best cast-iron, was cast hollow, and cooled from within. This introduced the principle of initial tension. These guns were excellent weapons in their time and were used for years in our coast defenses. Fifteen-inch guns of the Rodman type were still mounted in forts in the United States and were considered effective even up to the Spanish-American War in 1898, and some of them were afterwards converted into 8-inch rifles by inserting an inner rifled steel tube.

The Dahlgren gun, also of cast-iron, designed by Admiral Dahlgren of the U. S. Navy, was largely used on our ships of war. This gun was cast heavy at the breech and light at the muzzle to best resist heavy pressures. It became evident, however, that no gun could be cast, even with the best of metal, to resist the heavy pressures due to charges sufficient to give the range and power for destroying ships of war armored with metal, and the breech-loading built-up gun became a necessity. Chambers and Treadwell, Americans, and Blakely, of England, were the first to invent such guns. They were constructed of wrought iron tubes, with hoops shrunk over them under initial tension. The breech-loading mechanism was applied to all the later guns.

Sir William Armstrong produced the first successful built-up gun; and this method of construction has been so perfected that the heaviest weapons capable of resisting the greatest strains of modern powders are now made by this method, gun steel being employed in the place of wrought iron.

Classification and Description.—Cannon, generally, may be divided into two classes: (1) Field guns, which include all those guns that may be transported with an army in the field, and which may be also classified as Mobile artillery; (2) Guns of position, or those guns which have stationary mounts. Cannon may also be classed as

muzzle-loading and breech-loading, though all modern guns are breech-loading.

To the first class belong: (1) *Mountain Guns.* These guns are light, built of steel, and easily separated into several parts, and are intended for use in mountainous or broken country where guns on carriages cannot be taken. They are carried on mules. Mountain guns of 1.65-inch and 3-inch calibres are used in the U. S. service. The 1.65-inch mountain gun only weighs 116 lbs., and the carriage 220 lbs. Two men can pack, unpack, and mount it. The ammunition is packed in boxes suitable for the purpose and packed on mules; (2) *Field Guns.* These guns are heavier and of larger calibre usually than the mountain guns. They are provided with regular carriages and drawn by horses, from four to six guns in the battery. Field guns usually, are of about 3 inches calibre, although they vary in this respect in different services. In the United States the present field gun is 3 inches in calibre and is made of steel. It is a rapid-fire gun, is provided with recoil cylinders and a trail spade to hold it in position. On the march the cannoneers are mounted on the limbers and caissons that accompany the battery; (3) *Horse artillery* use the same gun as the field artillery proper, but all the cannoneers are mounted on horses. It accompanies cavalry; (4) *Field mortars* are short guns and are used for high-angle fire against troops in intrenched positions, or where they are not exposed to direct fire. Field mortars vary in calibre, being in some services as large as six inches; (5) *Siege guns* are heavier and of larger calibres than the field gun proper. They are intended for the attack and defense of inland fortifications of a permanent character. In the U. S. service the 5-inch siege gun, the 7-inch Howitzer and the 7-inch mortar are used. The Howitzer is a shorter gun than the siege gun, but is longer than the mortar. All these guns are breech-loading and are built of steel. The siege gun and Howitzer are built-up guns, and consist of a tube, jacket and trunnion hoop, while the mortar is built of a single piece of forged gun-steel.

GUNS OF POSITION.

Guns of position include those guns mounted on sea-coast defenses, as well as those on modern warships. These guns are of many different sizes and calibres. All modern high-power guns are made much longer than formerly in order to burn more thoroughly the powder and to give increased power with less pressures. They are generally limited in length to 50 calibre, or 50 times the diameter of the bore; that is, a six-inch gun of 50 calibres length would be fifty times six inches or 25 feet in length. There is considerable diversity of opinion as to the most suitable length of high power guns to produce the most effective results. The concensus of opinion, however, is in favor of the 50-calibre gun.

Guns of position include those of small calibres as well

12-inch Breech-loading Coast Defense Rifle, showing Breech closed.

as those of the largest calibres. Those of the larger calibres in use in the seacoast defenses of the United States are 6, 8, 10, and 12-inch breech-loading rifles and 12-inch breech-loading mortars.

The 6, 8, 10, and 12-inch breech-loading rifles are used for direct fire against an enemy's fleet, while the mortars are intended for vertical fire and to fall on the decks of ships which are unarmored and can easily be pierced by them.

The heaviest guns mounted in the seacoast defenses of the United States are 12-inch rifles. A type 16-inch gun has been manufactured in the United States and others have been designated for coast defense, but none have been actually mounted and it is doubtful whether any other such guns will be manufactured. It is believed that the 12-inch gun, with its ultimate improvements, will be as powerful as may be necessary. The cost of the 16-inch gun is enormous and their rate of fire is necessarily very slow. In some of the earlier battleships of the U. S. Navy 13-inch guns formed the main battery, but on those of recent construction 12-inch guns are the largest used.

GUN-CARRIAGES.

Gun carriages may be divided into two classes: (1) those for Mobile or Field Artillery; (2) those for Seacoast Artillery, or Guns of Position.

They are intended to support the gun or mortar in firing. They provide the means for elevating and directing the gun, for taking up the recoil in firing and returning it to the firing position. Those for the field artillery are also provided with wheels to transport the guns, with their ammunition and supplies, from place to place. Carriages for seacoast guns, being placed in fixed positions, are constructed only to support them while firing.

The latter are also classified into (1) Barbette carriages, where the gun fires over the parapet; (2) Case-mate carriages, where the gun fires through a port or opening. They are also classified as *front pintle*, where the axis of the rotation is at the front end of the carriage, and *centre pintle*, where the axis of rotation is at about the centre of the carriage. These carriages may give the gun a *limited fire* or an *all-round fire*.

Barbette carriages are either *disappearing* or *non-disappearing*. The non-disappearing carriage is always exposed to the view of the enemy and must be loaded and aimed from the firing position. The disappearing carriage is lowered by the recoil of the discharge, and is loaded and aimed under cover.

The *gun-lift* is a Barbette carriage raised and lowered vertically, by power, to the firing position and lowered after firing in the same way. The slowness of this operation renders such carriages undesirable.

The *balanced-pillar* mount may also be raised or lowered at will, but has the same objection on account of its slowness of operation.

GUN.

Machine or rapid fire guns may either be mounted on fixed or movable mounts according to their uses.

The Buffington-Crozier type of disappearing carriage has supplanted all others in the United States. In was invented by General Buffington, a former Chief of Ordnance, and General William Crozier, the present Chief of Ordnance, U. S. Army, who has developed it to its present highly efficient state. The design of this carriage, in the firing and loading positions, is shown in illustration.

The advantages of the disappearing carriage over the non-disappearing mount are: (1) in affording almost complete protection from the enemy's fire; (2) that, as the gun is only visible for the short interval of time it is in the firing position, it is very difficult for an enemy to locate guns mounted in this way, or even the emplacements where they are mounted; (3) the gun may be loaded and aimed by direct fire, while the men serving it are in safety from an enemy's fire; (4) as the gun recoils to a low and convenient position the rapidity of fire is greatly increased. The gun is raised and lowered by a pair of strong lever arms which support it at their upper ends, and also a counterpoise weight, heavier than the gun, attached to the levers at their lower ends. The lever arms are supported near their centre by trunnions which rest in beds in a top carriage. The top carriage is provided with rollers permitting its movement to the rear, and contains two hydraulic cylinders in which pistons, secured to the non-recoiling parts of the carriage, operate. When the gun is fired it carries to the rear the upper ends of the gun levers, while the trunnions near their centre carry to the rear the top carriage. The lower ends of the gun levers move upward, raising the counterpoise weight, while the gun descends in an arc of an ellipse. The recoil is taken up by the hydraulic cylinders and the gun is retained in its position by devices provided for the purpose. The gun is returned to the firing position by releasing it and allowing the counterpoise weight to act. This is done promptly and without shock, due to the action of hydraulic counter-recoil buffers which are provided for the purpose.

Modern artillery carriages are made of steel and iron. Great care and precision are required in their manufacture. For field artillery the great aim is to make them as light as possible consistent with strength and serviceability, and to insure rapidity of fire and stability of position.

BREECH-MECHANISM.

As all modern cannon are breech-loading a brief description of the mechanism is necessary. Two systems are employed, viz.: The Screw System, and the Sliding Wedge System. The first is known as the French system, the second as the Krupp or German system. The essential features of the mechanism should be strong and serviceable and capable of being easily and rapidly operated.

1. Buffington-Crozier Firing Position.
2. Buffington-Crozier Loading Position.

The Sliding Wedge System is the simpler in construction. The Screw System, however, is mostly used in the United States for all but some of the lighter calibre guns. The mechanism consists of the *breech-block* which closes the breech, the *breech recess* or opening which receives the breech block, the *obturator*, which is the device for preventing the escape of gas, the gas check, the vent, and loading tray, the latter being a device used while loading to protect the breech recess. This system is also known as the *interrupted* or *slotted screw system*. The breech is closed by a breech-block, cylindrical in form, and inserted from the rear. This block is so hinged that it may be revolved horizontally to one side when the breech is opened; the screw on the block and that in the recess where it is to be inserted and engaged are divided circumferentially into sectors, cut in such a way that the sectors are alternately threaded and plain.

In closing the breech the block is revolved to a position opposite the breech recess, and its threaded sectors are made to coincide with the plain ones provided in the breech recess. The block is pushed straight in, its threaded sectors engaging with those in the breech recess by turning a translating crank provided for that purpose. Guns made on this system may be lighter than those of the same calibre made on the sliding wedge system.

The sliding wedge system employs a transverse sliding wedge or breech-block which passes through a slot cut through both sides of the breech and across the bore. In loading the wedge is pulled out, the charge is inserted through the rear of the breech, and the wedge is pushed back and secured in position by a screw which is operated by powerful handles.

GUN-BOAT: vessel heavily built, and armed with one or more guns of large calibre. Not being of great size, it is capable of running close inshore or up rivers, and has chance of escape from being hit by a larger vessel at the long range which the carrying power of its guns enables it to maintain. Gun-boats in their more modern form are mastless vessels mounting one large gun in the bow (sometimes carrying more than one gun), and propelled by an engine with single or twin screws. The gun is pointed by means of the helm or the screws, and such a gunboat is in fact a floating gun-carriage. Some of these boats carry an armor-piercing gun of 18 tons, on a draught of only 4 ft. But they have been designed to carry 35-ton guns, or heavier. In 1890, there were attached to the British navy 114 of these vessels, of which 43 were called third-class, and are intended for coast defense alone. A small flotilla of such gunboats, protected only by their small size, would be in coast defense a formidable opponent even for iron-clads. At the beginning of the century the United States had over 250 of these vessels; but the 'gun-boat system' was soon abandoned, though during the war of secession they

were again largely used. Some European navies are well provided with gun-boats.

GUN COTTON. See Explosives.

GUNDUK, *gŭn-dŭk'* (the *Great Candak;* the Little Gunduk being a tributary of the Gogra): river of India, joining the Ganges from the left or n. side, opposite to Patna, after a s.e. course of about 400 m. It rises among the Nepalese Himalayas; after a course of 200 m. it becomes navigable for boats of considerable burden. Near this point, the river touches the British territory, dividing it for 15 m. from Nepal.

GUNDULITSCH, *gŭn'dŭ-lĭch*, or GONDOLA, *gon'do-lâ*, IWAN: most celebrated Serbian poet of earlier times; 1588, Aug. 8—1638, Dec. 8; b. in the town of Ragusa; son of Francis Gundulitsch, the historian. After he had completed his primary education and philosophic studies under the Jesuits, he applied himself, at the early age of 21, to jurisprudence, making such rapid advances, that in spite of his youth, he was intrusted with the first offices of the Ragusan republic. On the bi-centenary anniversary of his death, a grand requiem was sung in memory of the poet, in the Academic Church of Agram. Gundulitsch's poetical works, lyrical, dramatic, and epical, are a faithful mirror of the stirring time in which they were composed. He was the earliest dramatic writer of the Slavic race, and the theatre of Ragusa, on which his pieces were performed, was the first Slavic theatre. His greatest and most celebrated work is an epic, *The Osmanli,* in 20 cantos, in which he sings the deeds of Osman II., and the fame of the Poles and their king, Wladislaw IV., in the campaign of 1621 (published, Ragusa 1626); The latest edition is that of Gaj (Agram, 1844). Of his dramas, may be mentioned *Ariadne, The Rape of Proserpina, Galatea, Diana, Armida, The Sacrifice of Love, Ceres, Cleopatra, Adonis,* and *The Coral;* of his other poems, *Hymn on the Greatness of God,* and *The Tears of the Afflicted Son.* Gundulitsch made several translations from the Italian poets.

GUNDWA'NA. See GONDWANA.

GUNJAH, n. *gŭn'jă*, the name given to the Indian hemp, gathered when in flower and containing its resin, and dried.

GUN-MANUFACTURE. In the article GUN (q.v.) a description is given of firearms of all classes. Their manufacture will be as fully explained in this article as its limits will admit.

In the last quarter century the manufacture of both small arms and heavy ordnance has been revolutionized. The highest order of scientific research and the greatest skill of the inventor and manufacturer have been taxed to the utmost to produce weapons suitable for modern requirements. The production of steel of the required strength and character to stand the pressures of modern

powders, in order to give the necessary dynamic force to the projectable, as well as to resist the destructive effects of the powder, has been the subject of exhaustive experiment. The arrangements and adjustments of the various parts in the building of heavy guns and carriages have required the highest order of skill and ingenuity.

Shot Guns.—All modern shot-guns are breech-loading and include magazine and automatic classes.

The barrels of high class modern shot-guns are made of fluid or compressed steel. Briefly, this process consists in forcing up the mold containing the melted steel against an adjustable and strongly supported head of proper size, and maintaining this pressure until the steel solidifies. Great strength is required in the ingot mold to stand the immense pressure to which it is subjected. The mold is so arranged as to allow the escape of the gases while the pressure is maintained. This is the Whitworth process. Barrels made of such steel are used for the most expensive classes of shot-guns.

The selected barrels come from the manufacturer in the rough, in single form, and are finished by the gun-makers. Two of these are brazed together and finished to form the double-barreled shot-gun. The axes of the barrels are not placed parallel, but are so adjusted that they cross one another at a distance of forty yards from the muzzle.

Shot-gun barrels are also made of *damascus, laminated* and *stub steel twist.* Damascus barrels consist of a number of alternate rods of iron and steel forged and welded into a single bar and then rolled into rods. These rods are heated and twisted by machinery into the form of screws or spiral coils. Three of these are so placed that the twist of one will be in an opposite direction to that of the other two; by welding they are again formed into a bar and rolled into a strip about three-fourths of an inch in width, the thickness of which depends on the part of the barrel it is to form, those for the breech being thickest, while the thickness of the others is graduated towards the muzzle where it is the thinnest. By again heating they are turned about a mandrel into short coils which are then welded together until the coils unite and form a hollow cylinder. This is hammered on a mandrel until the welding is complete. By welding together, these cylinders form the barrel, the different thicknesses giving the conical form. It is completed after boring and grinding.

Laminated steel barrels are made of steel scrap thoroughly cleaned and mixed with a proper proportion of charcoal iron which, after the necessary heating and puddling, is forged, drawn out under a tilt hammer, rolled into strips of the necessary length and thickness, and then finished.

Stub twist barrels are made of the best wrought iron or steel scrap, mixed with stubs, welded, rolled and finished as already described. The different parts of the

locks also come from the manufacturer in the rough form and are finished and put together by the gunmaker. Fine engraving adds to the beauty and cost of these guns. The best of stocks are made of walnut and other fine wood.

The hammer guns have almost disappeared except in the cheaper grades, the hammerless taking their place.

Magazine shot-guns on the Winchester plan, and automatic shot-guns on the recoil system, are also made.

Gauges or Bore of Shot-guns.—The gauge or bore of the shot-gun is determined by the number of balls the size of the bore, that will weigh one pound. Thus a 10 bore gun is one in which ten bullets that will fit the bore will weigh one pound, etc.

Boring.—Originally barrels were cylindrical in bore, but to improve their shooting qualities modern gunmakers generally *choke-bore* their guns. This is done to concentrate the charge of shot by contracting the bore, improving greatly its range and pattern, or killing circle. The test is to get such a pattern at forty yards in a thirty inch circle, so that there will be no spaces where the smallest game bird can escape being hit by the shot.

The main principle of choking now is to maintain the cylinder until the muzzle is nearly reached, when it is contracted in size, giving what is called the 'choke.' This is termed full or modified choke according to the degree of contraction.

Many of the best shot-guns are now provided with an automatic ejector, that is, one which throws out the empty cartridges automatically as soon as the breech is opened, thus aiding in rapidity and convenience of loading.

Rifles.—The small arms rifle has already been described under the head of Small Arms. The barrels are made of short bars of steel which come from the manufacturer in ten inch lengths, and are of a thickness necessary to form the complete rifle barrel. These are heated to a red heat and passed lengthwise through a series of rollers provided with grooves of various sizes and so cut that they are larger at one end than they are at the other in order to give the proper conical shape to the barrel after rolling. The barrel is straightened under die and drop, and annealed in line from the resident heat in rolling. It is then cooled and turned true in a lathe, and afterwards drilled. The rifle grooves are then cut by machinery and the parts assembled in order to make the complete rifle. The stocks are cut out roughly by sawing and then turned down by a machine, guided by a pattern and finished by hand.

The stocks are made of selected walnut.

Cannon.—The manufacture of cannon, or heavy ordnance, on account of the great strains to which they are subjected in actual service, is much more complicated and difficult than that of small arms. Despite the improved methods in the manufacture of steel, and the im-

provement in casting and treatment of heavy cast-guns, they have failed to meet modern requirements. Uniformity in strength cannot be secured in such large masses. It has therefore been necessary to build guns of smaller parts which, when assembled, form a whole. Small cannon may still be made of a single piece, or forging, but the larger guns are necessarily composite or built-up.

Built-up Guns.—Built-up guns are of two classes: (1) The built-up gun proper, or those composed of an inner tube extending throughout the length of the bore, with steel forgings, cylindrical in shape, shrunk over it in such number and thickness as may be necessary for the required strength; (2) The wire-wound gun, or those with an inner tube as in the first-class, but instead of the steel forgings wire is substituted, the wire being wound around the tube in sufficient thickness. The built-up gun may be a combination of steel forgings and wire.

An understanding of the pressures of powder and the different stresses brought to bear on the gun have shown the necessity of the built-up system. In casting cannon whole it was found that increasing the weight of metal, after a certain limit, did not increase the power to resist circumferential tension. Effort was therefore directed to make a gun in which each of its parts would perform its share of resistance. General Rodman, of our army, appears to have been the first to grasp the situation, the principle of *initial tension* being applied in his cast-iron smooth-bore cannon which gave greatly increased strength for those guns, and, doubtless, has indicated the mode of construction of the modern built-up gun. After casting a cannon he kept the exterior at great heat, cooling the interior by passing water through it, thereby forcing the mass to be cooled in a reverse order from the usual method. The inner surface of the gun cooling first contracted, thereby putting the next layer in a state of tension which was continued to the exterior of the gun, and the entire mass was, more or less, put in the same state. When the gun was fired the inner portion, being compressed, expanded by the pressure of the powder gases to, or beyond the natural diameter and transmitted the strain to the outer portions, giving support in resistance.

In the construction of built-up cannon, advantage of the principle of *initial tension* is taken, and the best disposition to secure the elastic qualities of the metal utilized. As the greatest pressure must be at the surface of the bore, the forgings are so placed over the tube to compress it up to the elastic limit when at rest, or before firing. This condition not only permits the extension of the metal to the elastic limit, but beyond it without deformation. Metals in the ordinary state are permanently deformed when the elastic limit is exceeded.

When the gun is fired it is subjected to several strains: (a) A strain which tends to tear it apart in a plane containing its axis; (b) A strain to pull it apart in the plane

at right angles to its axis. The first is called the *tangential* strain, and the second the *longitudinal* strain.

It is obvious also, that the gun is under the strain of the weight of metal which tends to bend or break it transversely. Therefore what is called 'stiffness' must be considered in its construction. Many of the older models of very heavy guns 'drooped' at the muzzle simply from the weight of the metal and lack of stiffness. In a cannon, made of a single piece of steel, with no initial compression or extension, the metal at the surface of the bore, will be permanently deformed or injured if the pressure of the powder, on firing, exceeds its elastic limit. But a cannon of the same dimensions, made of concentric tubes properly assembled in such a way that the metal at the surface of the bore is compressed to its elastic limit, will, in firing, stand not only the stress necessary to expand it back, a force equal to its elastic limit, but it may be further expanded to utilize the *elastic limit of extension.* A built-up gun is therefore made as follows: (1) A forged tube which forms the interior of the gun and supports the other parts; (2) A jacket, the next to largest forging which is shrunk over the tube at the breech portion or base and carries in rear the base-ring to which the threads of the breech-

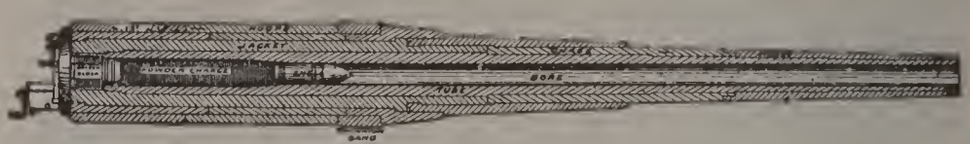


Fig. 1.

block engage, the reinforce hoop, the trunnion hoop and the chase hoop. There may be one or more layers still placed over these according to the requirements of the gun. These forgings are all shrunk over the tube in such a manner as best to secure the greatest power of resisting the stresses to which the gun is subjected in active service. When layers overlap they are arranged to break joints and to interlock in order to better sustain each other.

Before being placed in position these forgings, or cylinders, are smaller in diameter than the tube or parts to be encircled. By heating they are expanded and thus enlarged so they may pass over the parts they are to envelop

The smaller guns in our service, as the mountain guns and field and siege mortars, may be made of single forgings. Larger guns are built-up. Those guns of 6-inch calibre and larger are hooped to the muzzle. In some of them, as in the 6 and 8-inch guns, there is but a single layer of hoops over the jacket. Those of larger calibres have two layers.

Fig. 1 illustrates the general manner in which a large built-up gun is formed. The construction of various guns is illustrated in Figs. from 2 to 11.

In the latest models of guns of long calibre the number of hoops has been considerably reduced due to the superior quality of large masses of steel produced by improved

Fig. 2.
3½ in. Bl. Steel Field Rifle.

Fig. 3.
7 in. Bl. Mortar, Siege.

Fig. 4.—6 in. Breech Loading Rifle, Navy.

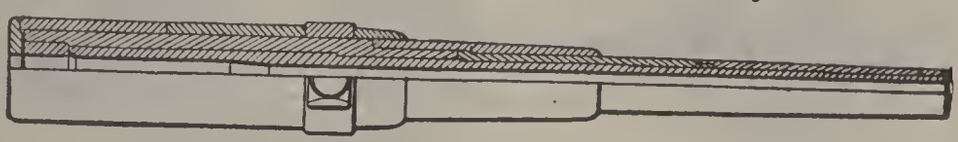


Fig. 5.—8 in. Breech Loading Rifle, Coast Defence.

Fig. 6.

Fig. 7.—10 in. Breech Loading Rifle, Coast Defence.

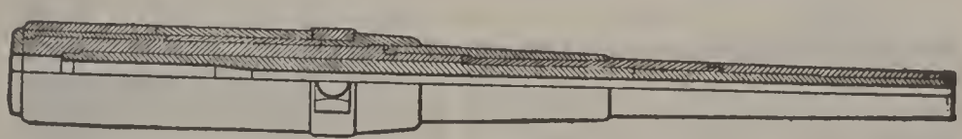


Fig. 8.—12 in. Breech Loading Rifle, Coast Defence.

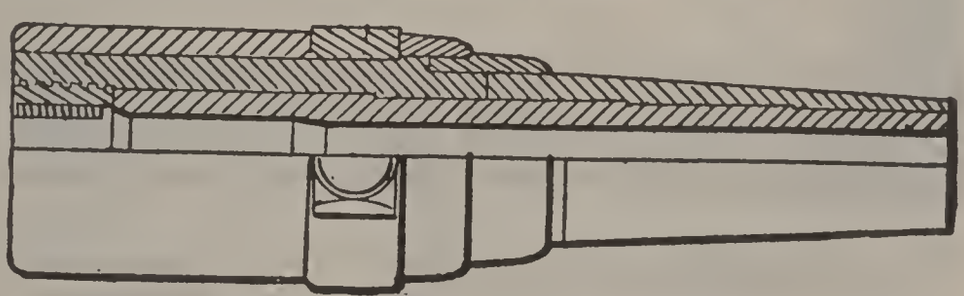


Fig. 9.—12 in. Mortar Steel, Coast Defence.

Fig. 10.—13 in. Breech Loading Rifle, Navy.

Fig. 11.—16 in. Breech Loading Rifle, Coast Defence.

manufacture. This has simplified construction and at the same time afforded increased longitudinal strength and stiffness of the gun.

The wire-wound gun is designed to better utilize the strength of the metal in the gun. In the built-up gun proper, it is claimed that only the inner layers of the tube and jacket are strained to the elastic limit—that if the gun could be made of very thin cylinders that each cylinder would be strained to its elastic limit, and therefore greater strength for the same amount of metal is obtained,

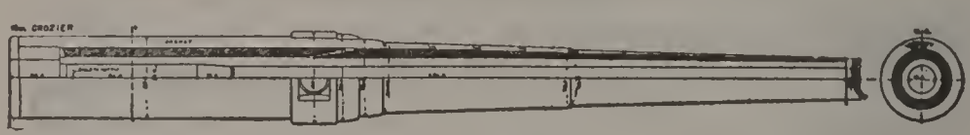


Fig. 12.

and that layers of wire wound around the tube so as to compress it in the same way as the forgings, will give, approximately, such a result. The wire being small in section is liable to be much more sound, and defects better detected; besides a high elastic limit can be given the wire, and the tube compressed beyond its elastic limit. It is objected that the compression of the inner layer of the tube beyond its elastic limit violates the fundamental principle of gun-construction, that the coils of wire have not sufficient longitudinal strength and the gun lacks stiffness.

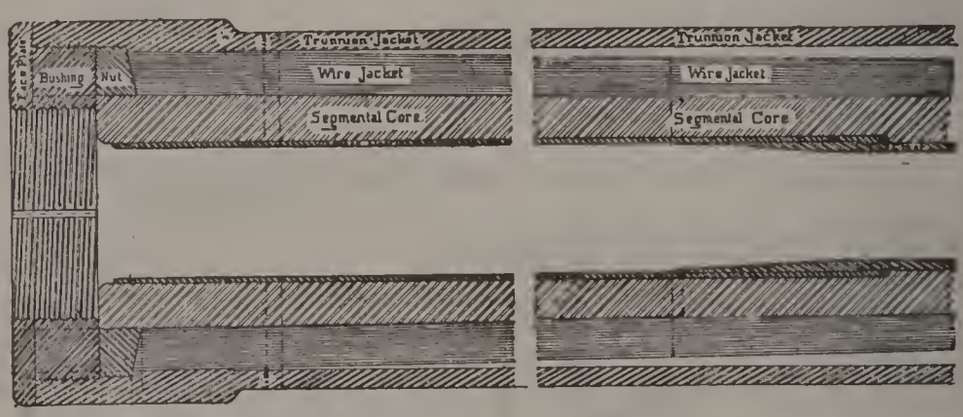


Fig. 13.—Longitudinal and Cross Sections of the 10 in. Brown Segmental Wire Gun under construction for the U. S. Government.

Wire-wound guns, however, are made and give excellent results. It is the standard weapon of the British Navy. The wire-wound gun was first made in England and is the invention of J. A. Longridge, an Englishman.

The Crozier Wire-wound Gun.—In this gun a steel jacket is used to assist in supporting the longitudinal strain and place the breech-block. The chase is protected and stiffness increased by placing, with slight shrinkage, thin hoops over it. The jacket and tube are connected and motion of either prevented by steps which abut against each other. See Fig. 12.

The Brown Segmental Gun. (See Figs. 13 and 14.) This gun consists of an inner lining tube extending beyond the trunnions. This tube has a high elastic limit. The main tube is formed of wedge shaped steel bars also of high elastic limit. This tube is wrapped and so compressed by wire that its interior is under compression

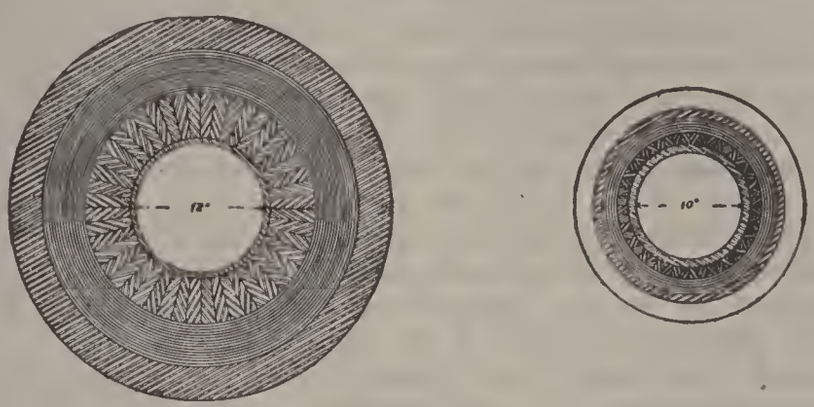


Fig. 14.—Sections one foot from breech and one foot from muzzle.

even when under the stress of the powder gas. A light jacket is placed over the wire but is not in contact with it except at the trunnions and breech. The pull of the block at the breech and the thrust of the trunnions in front are borne by the jacket, and motion of the tube and jacket are prevented by the connection in rear.

GUNNEL, *gŭn ĕl* (*Gunnellus* or *Murœnoides*) : genus of fishes of the Blenny (q.v.) family, of more elongated form than the true blennies. The species are numerous. The spotted gunnel, called in England BUTTERFISH, is used there as bait. See STROMATEUS.

GUNNERY: the art of using guns so as to obtain the most effective results of their fire action.

The motion of projectiles has been the study of the philosopher and scientist for centuries, but only in comparatively recent times have accurate and practical results been obtained.

Ballistics is the science that treats of the motion of projectiles. See BALLISTICS.

Interior Ballistics treats of the action of the powder when the charge is ignited on firing the gun, and the motion of the projectile until it leaves the muzzle.

Exterior Ballistics treats of the motion of the projectile after it leaves the gun.

In order to better understand this subject the character and form of *gunpowder*, the propelling force of the projectile, will be briefly discussed. When first used in guns it was composed of nitre, charcoal and sulphur, in practically equal parts, and made in the form of dust from which it took its name. Later the proportion of saltpetre was increased from 3 to 1 of the other ingredients, then 6 to 1, which is practically the proportion it has held in modern times.

In the 16th century the form of gunpowder became

granular, it being found more easily handled and to give better results.

In 1860 General Rodman found, by regulating the form of powder, combustion could also be regulated, and hence the pressures of the gases within the gun. By compressing the fine grains into large grains of greater density the spherical forms of powder were made. Slower and progressive combustion resulted, and higher muzzle velocities with lower maximum pressures. These powders took the hexagonal and sphero-hexagonal forms. The perforated prismatic form of molded powder, as large as one inch high and one and one-third inches across the faces, was made for larger guns. See Figs. 1, 2 and 3.

The perforation of the grain increased the surface of combustion, and underburned charcoal used gave the 'brown' or 'cocoa' color from which it took its name. This powder supplanted all other kinds for heavy ordnance. The size of the powder grain was proportioned to the size of the gun, the smallest grain for small arms.

In 1886 smokeless powders were introduced which have replaced all others as the propelling force. In the United States service these powders are made of gun-

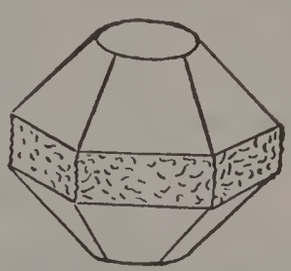


Fig. 1.

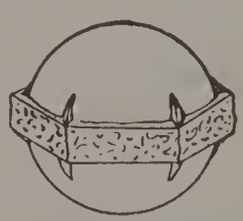


Fig. 2.

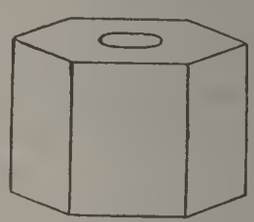


Fig. 3.

cotton and are of two classes: (1) Nitro glycerine, used for small arms, and (2) Nitro cellulose, used in cannon. The small arms powder has 30 per cent. in weight of nitro glycerine added to it.

The superiority of these powders is very pronounced. They are practically all consumed and converted into gas, while the black of charcoal powder leaves a large solid residue with only about 43 per cent. of the powder converted into gas. A smaller quantity of smokeless powder may be used to produce the same amount of gas, and smaller charges give the projectile the same or better velocities. Fig. 4 shows a section of the service multi-perforated cylinder grain of smokeless powder before burning. Fig. 5 shows the same after partial combustion.

INTERIOR BALLISTICS.

Explosion of Gunpowder.—The explosion of the charge is its conversion into the gaseous form. It is rapid and is accompanied by great heat, and may be divided into three phases: *Ignition*, *Inflammation* and *Combustion*. The charge is ignited by primers which are fired by electricity, friction or percussion. Inflammation then takes place spreading from grain to grain of the charge. This

is slower in the finer grained powders than in the modern large perforated grains, in which the spread is facilitated and is so rapid that it is supposed to result at the same instant for the entire charge. Combustion of the inflamed grain now results and takes place on the outward surface inward, and, if perforated, also from the inside surface outward. The gases evolved accumulate behind the projectile until they gain sufficient force to move it. Combustion continues along the bore and the gases increase in force, exerting a continual and increasing pressure on the projectile until it leaves the muzzle of the gun.

The effect of the progressive combustion of the powder and the consequent increased velocity have had the effect of increasing the length of guns to gain higher power and, in late years, caused the abandonment of the shorter cannon of the earlier models in order to keep apace with modern requirements. There is no standstill in ordnance, and the improved gun of to-day must be adopted by the great powers to meet the greater resist

Fig. 4.

Fig. 5.

ance in the increased power of the armor of battleships. Thus a continual struggle in this regard goes on for superiority.

Pressure Gauges.—Measurement of pressures of the powder gases, inside the gun, is directly accomplished by pressure gauges. The gauge is made to record the pressure by the deformation of a copper cylinder so placed in the bore of the gun that the full pressure of the powder gases is exerted upon it. The cylinder is measured carefully before and after firing and the compression due to the pressure determined. This is read from a graduated table determined by a static pressure machine by applying pressures necessary to produce the reductions in length of the cylinder in one column and the force producing it in another. This is called the 'tarage' table. The gauge consists of the body which contains a piston moving in a cylindrical channel upon which the pressure is exerted. This acts on the copper cylinder which is in contact with the piston.

The Rodman pressure gauge was invented by General Rodman, U. S. Army, and embodies the principle of

the present Crusher gauge which has replaced the Rodman, in which the pressure was measured by cutting into the copper disk by a knife pressed by a piston instead of the compression of the disk as on the Crusher gauge.

B body, *d* disk of copper, *C* knife, *p* piston, *P* screw plug, *c* cap to act as gas check. This gauge was placed in the centre of the cartridge at the bottom and tied in position by a string at the groove *G*, and resting at the bottom of the bore. It may also be screwed into the breech-block or walls of the bore. The body in this case must be threaded to fit into a socket provided for the purpose.

EXTERIOR BALLISTICS.

Exterior ballistics describe the motion of the projectile after it has left the gun. The path described is called the *trajectory*. If the projectile were not acted upon by the force of gravitation, atmospheric resistance, wind and other forces, the pointing of the gun would be simplified. If a gun be fired from a horizontal position the projectile, acted upon by the force of gravity, begins to

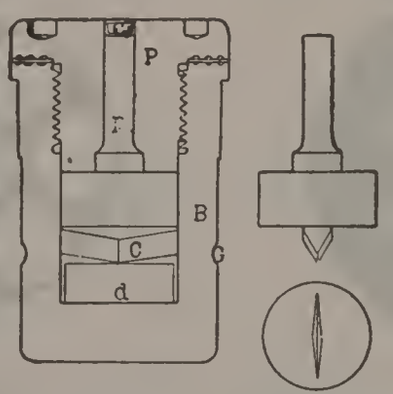


Fig. 6. Fig. 7.

fall immediately that it leaves the support of the surface of the bore, and will strike the ground in the same time that it would *if let fall direct from the muzzle of the gun.* Therefore, if the projectile is to be carried to a considerable distance it is evident that the gun must be elevated at the muzzle and that the projectile must ascend in order to be carried to the given point.

Pointing.—This consists in giving the gun the necessary elevation and at the same time direction, that the projectile may hit the object aimed at when fired. *Front* and *rear* sights are used for this purpose. The front sight is usually fixed, for small arms, at the muzzle of the gun, and for cannon to one of the rimbases (see Fig. 8) usually on the right side. This sight is a fixed point, a thin edge or cross wires, located at a definite distance above the axis of the bore. If on the rimbase, as in cannon, it is located at a fixed distance to the right or left of the axis of the bore.

Rear Sight.—This is formed of a rod, bar or standard, graduated in degrees or ranges and fixed in a socket to

the breech of the gun. A sliding notch or small hole is attached which may be elevated to any height necessary to give the range or elevation.

The telescopic sight is also used. It consists of a telescope carried by an adjustable frame and attached to the gun.

In sighting mortars the gunner's quadrant may be used to measure the angle of elevation when it exceeds 15 degrees. This is a simple instrument and consists of a body and movable arm. The body is made of bronze and carries an arc which is graduated on one side from zero to 44 degrees. To explain the method of pointing let Fig. 8 represent the gun in outline.

DE is the axis of the bore, *F* the front sight on rimbase, *CB* the rear sight standard, *BA* the sliding piece at right angles to the standard, and *A* the notch. The triangle *ABC* is the *triangle of sight* and the angle at *B* a right angle. The point *C* is the zero of sight, and is on a line parallel to the axis of the bore through the top of the front sight. The line *CFH* is the *natural line of sight* and is parallel to the axis of the bore. *CF* is the *sight radius.* Any line as *AFK* is an *artificial line of sight. The natural and artificial planes of sight* are the vertical planes containing the natural and artificial lines of sight.

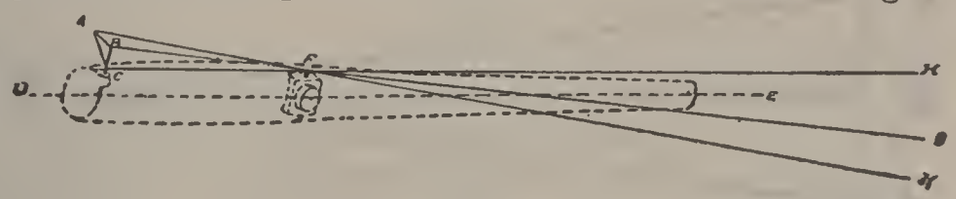


Fig. 8.

The plane through the rear sight and perpendicular to the axis of the bore is the *plane of the rear sight ABC.*

If the gun be correctly pointed the projectile should hit the target, but this will not result unless corrections be made to allow for deviations due to various causes, as (a) effect of the wind, (b) errors in estimating the distance, (c) effect of light on sights, (d) visual errors of the eye, (e) errors in the height of the front and rear sights, (f) motion of the target if not stationary, (g) variation in the ammunition, (h) rotation of the earth and (i) the jump of the piece.

If the wind be blowing in the direction of the target it will increase the range; but if it be blowing from the target it will decrease it. If blowing across the line of fire it will tend to carry the bullet to the right or left as the case may be. The velocity of the wind may be obtained by an anemometer. Its direction is indicated by a vane or other indicator and is expressed in miles. In small arms firing the wind is indicated according to the face of a clock. Thus a wind blowing from the target is called a 12 o'clock wind, one from the left a 9 o'clock wind, the clock face being horizontal with the 12 o'clock mark towards the target and the 3 o'clock to the right.

Tables are provided showing the strength of the different winds and the deviation corresponding thereto. Distance may be estimated by the eye, by sound and by instruments.

To estimate distance by the eye is a matter of judgment and practice and can only be done with sufficient accuracy at short distances as the light and background are different at different times. Distances can be estimated by sound remembering that sound travels at the rate of 1,100 feet per second. By a stop watch, or other means, the seconds are counted and the time noted between the flash of the gun and the time it takes the sound of the report to reach the observer, then multiplying this by 1,100.

The Le Boulenge telemeter is used for this purpose. This consists of a glass tube filled with liquid in which a disk is placed with a specific gravity a little greater than that of the liquid. It is held horizontally and when the flash is seen the tube is turned quickly to a vertical position and the disk falls through the liquid with a uniform motion. When the report is heard it is turned back to the horizontal position and the scale read,

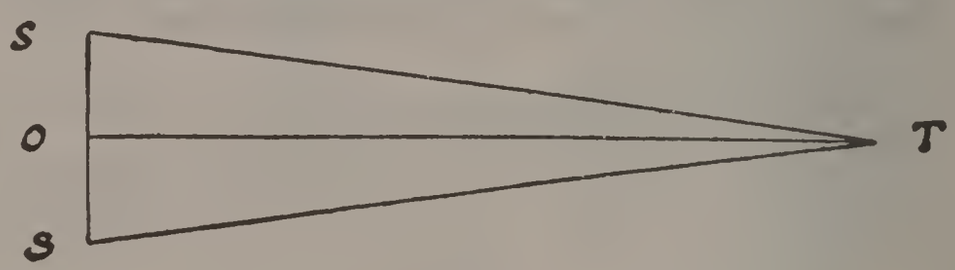


Fig. 9.

which gives the range corresponding to the distance passed over by the disk. These methods are inaccurate, and instruments of greater precision called *range-finders* have been devised to measure distances.

These instruments all depend for their measurements on the solution of trigonometrical problems, which must be rapidly done. They are divided into several classes A description only of a simple form will be given in which the base is proportional to the range and the principle on which it is based.

In the isosceles triangle (Fig. 9) let T be the target SS' the base, then OT is the range, which equals $\frac{1}{2}SS'$ divided by the tangent of $\frac{1}{2}STS'$; or in the right angled triangles at O– if the angles at S and S' are known the angle STS' can be found, and the range OT is equal to the base SO divided by the tangent of STO. In constructing the range-finder the angles at SS' are so fixed that the tangent or sine of T shall be a simple number as 1-20, 1-40, 1-50, etc., and the multipliers correspondingly put on the instrument.

Let the figure 10 represent two mirrors fixed at an angle of 44° 17′. A ray of light striking one of the mirrors

is reflected twice and then, according to a well-known law of optics, makes, with the original direction of the ray, an angle of 88° 34′, or twice the angle of the mirrors. An observer, standing at S and looking towards S', sees S' directly and, by the reflection in the mirrors, makes the images of T coincide with S'. The point S is marked, then moving to S' along SS' and looking back to S, the reflection of T is made to coincide with S. The angle at T is 180° less twice the angle 88° 34′, or 2° 52′. Measur-

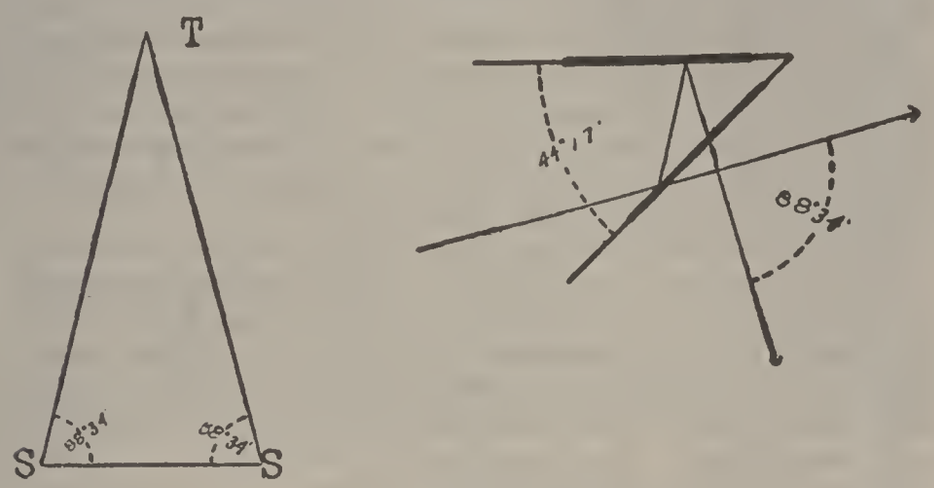


Fig. 10.

ing SS', the distance ST is found by dividing $\frac{1}{2}SS'$ by the sine of $\frac{1}{2}$ the angle STS', which equals $20SS'$.

Where the bases are fixed the instruments are so adjusted that the ranges can be read off at once. Telescopes are used to measure the angles. These require accurate mounting.

Depression range-finders are used in seacoast defenses where the gun is located above the water. They determine distances to ships at sea, the angle being measured in a *vertical* plane.

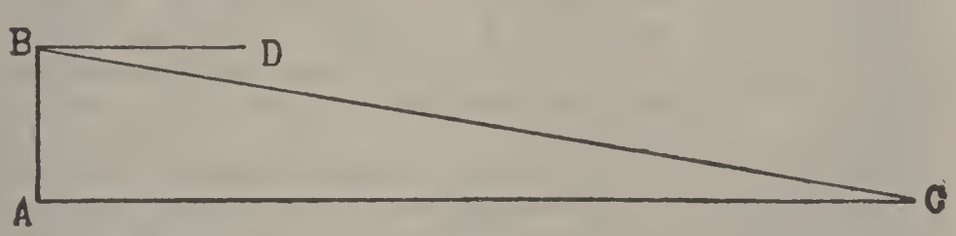


Fig. 11.

In Fig. 11, B represents the range-finder, C the ship, the height AB being known, then by measuring the angle DBC, the distance AC, by the ordinary methods, may be determined.

When guns are so located that the object fired at cannot be seen, the location of the object must be determined. This is done by the position finder, a graduated table and plotting device. The necessary data, when determined, is sent to the gun to be fired.

The Lewis Depression Position Finder, invented by

Lieutenant I. N. Lewis, U. S. Army, is of two types—one for emergency, and the other for permanent work—and is used in the U. S. service.

Ranges may be determined by *trial shots*. First, by firing a percussion shell which will fall short. The explosion shows its point of fall. A second shot is fired over the target and both points of fall noted. A mean of these two elevations will give the approximate range. It may be necessary to repeat this operation in order to get the correct range.

The second method is to fire the first shot short and to increase the elevation slightly, observing the fall of each shot until the range is found. These methods are used by field artillery. (The errors due to *light* and the *eye* vary with the light and the individual, and must be corrected by judgment and training.)

The error of the front and rear sights occurs when the *zero* of the rear sight and the *top* of the front sight are not at the same distance from the axis of the piece. This is corrected by adjustment. Should the target, as a ship, move away from or toward the gun, or at an angle to its line of fire, allowance in sighting must be made for such conditions. The *rotation* of the earth is rarely considered; the effect in this hemisphere is to cause projectiles to deviate to the right.

Variations in ammunition affect the range by increasing or decreasing it as the charge and density of loading are increased. If the projectile be increased in weight the velocity naturally decreases. The accuracy, however, in the manufacture of ammunition is so great that these variations are very slight and may be neglected. Variations in moisture affect the velocity, as a damp powder will not give as high a velocity as a dry powder. The heating of the bore from firing increases the velocity as less heat is lost by the gases.

Jump is the error caused by the motion of the gun when fired, due to vibration in the gun itself, elasticity of the carriage and inaccuracy in fitting the gun to the carriage. This varies with different guns and is determined by direct experiment.

Drift is the departure of the projectile from the plane of fire on account of the resistance of the air and rotation about its axis, due to the rifling of the gun. The twist of the rifling is generally to the right, and when this is the case the drift is to the right. The exact motion of the projectile, as effected by these forces, is very complex and does not appear to be clearly understood.

The cause of drift is explained as follows: As the projectile leaves the gun, rotating about its axis to the right, the force of gravity and the resistance of the air both act upon it, the former tending to bring it to earth, the latter opposing its translation; at this moment the long axis of the projectile is tangent to the trajectory and the resistance of the air acts *along* this tangent. See Fig. 12.

Owing to the action of gravity the tangent changes its

inclination, while the axis of the projectile tends to remain parallel to itself, but the force of the air, acting still in the direction of the tangent, becomes inclined to the longer axis of the projectile, and its *resultant* intercepts this axis at a point in front of the centre of mass *B*, of the projectile and tends to overturn it about a short axis at *B*, on the lever arm at *BC*. The energy of rotation prevents this, but the result is that the point of the projectile is forced slowly to the right, the direction of the rotation. As soon as this change occurs the resistance of the air is directed more to the left side of the projectile and produces an oblique pressure on that side which forces it to the right. The resultant of this oblique force and that of rotation causes the point of the projectile to move downward and to describe a cone about the tangent to the trajectory and to force the projectile out of the plane of fire to the right. The curve of the trajectory becomes one of double curvature. The drift increases with the range.

For small arms and those guns on fixed platforms, corrections for drift may be made by inclining the rear sight standard to the left, which has the effect of moving the muzzle sufficiently to the left to counteract the drift.

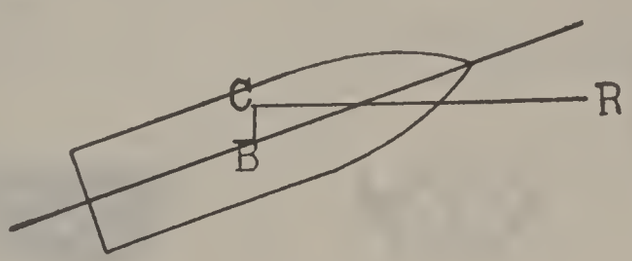


Fig. 12.

The effect of the resistance of the air varies with the form of the projectile, its cross section and velocity, as well as the density of the air. The ogival form of the head of the projectile offers less resistance than other forms, while the cylindrical body offers more than that of those made barrel-shaped in rear, as the Whitworth projectile, though considerations in manufacture, packing etc., make the present form more desirable.

The resistance of the air varies directly with its density, which varies with the temperature. Accordingly the taking of readings of both barometer and thermometer are necessary in its calculation in order to obtain accurate results.

Direct Fire.—In this class of fire the object fired at can be seen from the gun, which can be pointed directly upon it, and is the simplest kind of pointing.

Indirect Fire.—When the object cannot be seen by the gunner. This is the case with mortars that are placed in pits, or other points out of sight, and with guns in permanent works, for coast defense as well as for field guns which may be placed behind the crest of hills or other protection. Indirect pointing in such cases becomes necessary. The simplest method is to obtain the

plane of sight by plummets, and the elevation, approximately, by an observer above, who can see the target; or, in case he cannot see it, to go to a point where it can be seen and observe the point of fall and signal the necessary corrections. The compass may also be used, the bearing being laid off by stakes. Reflecting sights may also be employed.

In a system of permanent works, as seacoast defenses, the pointing is directed from central points. Some sufficiently high point is selected where instruments are placed in a building erected for the purpose, and observations taken, calculations made and the necessary data sent by telephone to the guns in the different batteries, giving both the range and direction. The time and kind of fire is also regulated by the directing officer, who controls the entire system. Such arrangements are termed *systems of fire control.* In the case of field guns which, on account of the dangerous fire to which they are subjected, cover often becomes necessary, and indirect fire is resorted to. This is accomplished by taking observations from a point where the target may be seen, determining the range and position, and making the necessary

Fig. 13.

corrections for the directing gun in the battery by practically the same methods as already explained.

Determination of Velocity.—The velocity of the projectile after it leaves the gun is determined by measuring the time it takes to pass over a given distance, and then obtaining the mean of this velocity per second by dividing the distance passed over by the time of flight. If the exact time a bullet passes a point in its flight, as B, is ascertained, and then another point at a convenient distance from this point, as C, it is evident if this distance is divided by the time required to pass over it the velocity will be obtained, or V equal D divided by T, D being the distance and T the line of flight.

In order to measure this distance the two points must be selected at such a distance apart in the path of the projectile that the motion of the projectile in passing between these two points may be considered as a right line and uniformly varying. In obtaining the velocity of the bullet of the small arms rifle the first point is selected at a short distance from the muzzle of the gun. In that of cannon it is selected farther away to avoid the blast of the charge. Two targets are put in position, one at a

point as B, and the other directly in the line of fire at *C*. These targets are constructed with wires so arranged that the projectile must cut these wires as it passes through each. Electric currents are made to pass through the wire. The projectile successively breaks the circuit ns in each turn, the time of which is registered by an instrument provided for the purpose. The difference between these breaks, measured on a scale of time after correction for errors, gives the time of passage from which the velocity is obtained by a simple calculation. This instrument is called the chronograph. That generally used is the Le Boulengé *chronograph*, invented by Captain Le Boulengé of the Belgian army, from whom it takes its name.

This instrument is somewhat complicated but a brief description will explain its mode of operation: Two rods are suspended vertically from electric magnets through which the currents pass, and also through the targets. Each magnet has its own current and its own target independent of the other. When the projectile breaks the first target the circuit is broken, the magnet is demagnetized and its rod falls. The same thing happens when the second target is broken and its rod falls. The second rod, in falling, makes a mark on the first rod while it is falling, and the distance from the origin of fall to this mark is measured, from which, by the laws of falling bodies, the time is ascertained. This instrument gives the velocity at one point only. If the velocity is to be measured at several points an instrument called the *chronoscope* is used. There are several instruments of this class. One of the best known of its kind is the Schultz chronoscope.

The initial velocity of ammunition for small arms is generally marked on the boxes containing the ammunition, giving the number of feet traveled by the projectile per second.

The early experiments of Benjamin Robins in 1743, with the pendulums he invented, were of much value in obtaining the velocities of musket balls. He used a pendulum of wood, and then a gun pendulum. The bullet was fired at the pendulum and the velocity impressed in it was measured. Dr. Charles Hutton continued his experiments with important results.

The Chevalier D'Arcy, Count Rumford, Noble and Abel, all pursued the study of ballistics, and to these great scientists much is due for the valuable information obtained.

The experiments of General Rodman, Chief of Ordnance U. S. Army, in 1857 to 1860, were of great importance. His process of the interior cooling of cast-iron cannon, the measurements of interior pressures by the invention of the pressure gauge, and the improvements in gunpowder, were of the greatest practical value to his country.

The Range, Penetration, etc.—The increase in the power and range of fire-arms in the last century has been very

remarkable. When the battle of Waterloo was fought less than a century ago, the headquarters of Napoleon Bonaparte and the Duke of Wellington, then safe from artillery fire, would to-day be under effective fire of small arms.

Smokeless powders, together with the improvement in gun-steel and that of projectiles, have reached such a point that enormous velocities and long effective ranges have resulted. The skill of the gunner in directing the shot by the use of instruments of precision enables him now to accurately send the projectile to enormous distances with great precision and effect. Small arms have reached such efficiency that effective results may be obtained at what formerly was the limit of effective artillery fire. Excellent results are now had at over one and one-half miles, while the bullet may be sent a distance of nearly three miles.

Field artillery has an effective range up to 6,000 yards and will doubtless be greatly increased. The small arms bullet, with its steel jacket, now penetrates steel shields at the shorter ranges. Tests show that this bullet, at three feet from the muzzle, will penetrate 14 inches of sand, and from 16 to 24 inches of solid oak. The low or flat trajectory has greatly increased the *dangerous space*, or the horizontal distance over which an object, the height of a man, will be struck.

In certain small arms the initial velocity has reached 3,000 feet per second, and the flatness of the trajectory greatly increased so that a man, standing, would be hit nearly the entire distance up to 1,000 yards.

The range of seacoast artillery is calculated to be about a mile for each inch in calibre. A 12-inch gun will fire a projectile to a distance of over 12 miles, while at effective ranges, with the improved steel piercing projectile, it will penetrate the thick armor plates on warships as easily as the old ones did the sides of wooden vessels. The rule being—the penetration of a projectile in wrought iron armour is one calibre for every thousand feet striking velocity. For example, should a 12-inch projectile strike with a velocity of 2,000 feet it should penetrate such armor equal to twice the calibre of the gun, or 24 inches.

By use of the soft steel caps on projectiles the penetration on face-hardened armor has been greatly increased. While no actual formula has been found to show the penetration on such armor it will probably be four-fifths, at least, of that of wrought-iron.

A shot fired from a 110-ton gun in England, with a muzzle velocity of 2,000 feet per second, penetrated 20 inches of compound steel and iron plate, 8 inches of iron, 20 feet of oak, 5 feet of granite, 11 feet of concrete and then buried itself in a 6 foot wall of brick masonry.

The 16-inch gun intended for coast defense in some of our great harbors is of much greater power, and its projectile will have an energy of 64,084 foot tons, capable of penetrating $27\frac{1}{2}$ inches of steel at a distance of two miles and should give an extreme range of $13\frac{1}{2}$ miles.

The ranges of a 9.2-inch gun fired in England, and that of a 9.45-inch gun in Germany, with a high elevation, were over twelve miles. The projectile, in its flight, ascended 4.6 miles in the air. In actual service, however, guns would not be fired at such elevations, nor would it be desirable to do so.

With the improved fuses and correct determination of ranges shrapnel fire has greatly increased in its destructive effect, and will be annihilating on masses or lines of troops when skillfully and accurately directed.

See GUN; GUN-MANUFACTURE and PROJECTILE Reference: Bruff's *Ordnance and Gunnery;* Lissak's *Ordnance and Gunnery.*

GUNNISON: a river of Colorado formed at Almont by the junction of the Taylor and East rivers. It flows southwesterly to Gunnison, near Cimarron enters the Grand Cañon of the Gunnison, 15 m. long, and continuing in a northwesterly direction past Delta unites with the Grand River at Grand Junction after a course of nearly 200 miles.

GUN'NISON CITY: city, cap. of Gunnison co., Colo.; on Gunnison river, and the Denver and Rio Grande and the Denver South Park and Pacific railroads: 170 m. w. by n. of Pueblo, 291 m. s.w. of Denver. It is supply depot and metropolis of the famous 'Gunnison country,' one of the richest gold, silver and coal regions in the world, which has been worked less than 26 years (1903). The region is picturesque, watered by the Gunnison, Grand, and Otto rivers, and contains many high peaks of the Elk Mountains. Prospectors crossed the Elk Mountain range 1860, the Ute Indians drove early settlers away 1863, and sold their country to the govt. 1873, the first discovery of the precious metals in the Ruby district, 30 m. n. of Gunnison City, was made 1879, June, and the Indians were removed to Utah and their late reservation thrown open to miners 1880. Pop. (1910 est.) 1,500.

GUNNY BAGS: bags of a coarse kind of cloth or sacking, manufactured in India, chiefly in Bengal, whence they are largely exported. The fibre of which the cloth is made is chiefly that of the same species of *Gorchorus,* which yield the jute (q.v.) of commerce. The cotton of America is mostly packed in gunny bags, of which the number exported to America from Bengal increased from thousands in 1796 to millions in 1907. Great quantities are exported also to China, Australia, and other countries. They are partly made into bags in Bengal, partly exported as Gunny *chuts* or *chuttees,* pieces of size suitable for being immediately made into bags. The manufacture of these is the great domestic industry of all the populous eastern districts of Lower Bengal. It pervades all classes, and gives occupation to men, women, and children. Boatmen employ themselves in it in their spare moments, husbandmen, palanquin-carriers,

and domestic servants, being Hindus, for Mohammedans spin cotton only. It 'forms the never-failing resource of that most humble, patient, and despised of created beings, the Hindu widow, saved by law from the pile, but condemned by opinion and custom for the remainder of her days, literally to sackcloth and ashes, and the lowest domestic drudgery in the very household where once, perhaps, her will was law.' (Royle's *Fibrous Plants of India.*) Hence the very low prices at which gunny bags are sold. There are few articles of commerce so widely diffused over the globe, as it is used for covering large packages of all kinds, including bags for holding coffee, wheat, rice, etc., and for cotton bales. Formerly the peasant hand-looms of the Lower Bengal were able to meet both the domestic and foreign demand but at the present time the number made at the great steam-factories, of which there are now 23 in India, far exceeds what is produced by hand-looms. For example, in one year 82,779,207 gunny bags were exported from India, of which only 5,000,000 were woven by hand.

GUNPOWDER. See EXPLOSIVES.

GUN'POWDER PLOT, THE: fanatical project of a few Roman Catholics in England to destroy the King, Lords, and Commons on the meeting of parliament 1605, Nov. 5. James I. had succeeded Elizabeth two years before, and his government had exercised great severities against the Rom. Catholics, not merely denying them religious toleration, but confiscating their property. A few ruined and exasperated men banded together to overthrow the government. The originator of the plot was Robert Catesby, who had impaired an inherited fortune by youthful extravagance, and who communicated his idea to Thomas Winter, who was horrified at first, but after a time began to approve and further it. For this end he enlisted into the conspiracy Guy Fawkes, a soldier of fortune, of considerable military experience, and most determined and fearless character. Catesby enlisted two others, by name Wright and Percy—the latter a relation of the Earl of Northumberland. They hired a house and a garden contiguous to the parliament-house, and commenced their mine, part working when the others slept, and the rubbish being buried during night. One day they were alarmed by a noise after they had with much labor pierced half-way the wall three yards thick. Fawkes learned that this noise proceeded from a cellar under the House of Lords, which would soon be vacant. He hired it, and 36 barrels of gunpowder were placed in it, and stones and billets of wood laid over them, for the double purpose of concealment and to act as destructive missiles when the gunpowder was fired. In the interval, a brother of Wright and a brother of Winter had been added to the conspirators, so they were now seven. But they wanted money; and to

supply it, two others were induced to enter this fanatical copartnery; they were Sir Everard Digby of Gatehurst, in Buckinghamshire, a young gentleman of large estates; and Francis Tresham, a follower of Essex, like Catesby and Percy, but, unlike them, a selfish unenthusiastic man—not a man at all suitable for conspiracy, except that he had two thousand pounds to contribute. Their plan was finally arranged for the reassembling of parliament, which was to take place Nov. 5. Guy Fawkes was to fire the mine (if the gunpowder in the cellar may be so called), and then flee to Flanders by a ship provided with Tresham's money, and waiting ready in the Thames. All the Roman Catholic peers and others whom it was expedient to preserve were to be prevented from going to the parliament-house by some pretended message or other, on the morning of the day. After all was ready, Lord Monteagle was at supper at his country-house at Hoxton, where he very seldom was. As he sat, a page handed him a letter received from a stranger, advising him "to devise some excuse to shift off your attendance at this parliament, for God and man hath concurred to punish the wickedness of this time." That this letter was written by or for Tresham, who was Lord Monteagle's brother-in-law, there can be little doubt. That he desired to save him was certainly one reason for writing; that he desired to save the conspirators, or at least to allow them to escape, is very probable; and that they might have escaped, but for the fanatical hopes of Catesby, is all but certain. It is also probable that Lord Monteagle had been fully informed of the whole matter by Tresham, and that the supper in the country and the letter were mere devices to conceal Tresham's treachery. When the letter was formally communicated to the king, he at once declared its meaning, and the most simple way of accounting for his power of divination is to suppose that, like Lord Monteagle, he had been told beforehand. On the very evening of the 4th, the lord chamberlain and Lord Monteagle visited the parliament-house, and entering the cellar in a casual way told Guy Fawkes, whom they found there, and who passed as Percy's servant, that his master had laid in plenty of fuel. Only fanaticism gone the length of fatuity could have made him persevere after this. But he did, though escape was still possible; and on the morning of the 5th, a little after midnight, he was arrested coming out of the cellar, dressed as for a journey. Three matches were found on him, a dark-lantern burning in a corner within, and a hogshead and thirty-six barrels of gunpowder. He was examined and tortured. He confessed his own guilt, but would not discover his associates. However, he and the chief of them were either killed on being captured, or died on the scaffold; except Tresham, who at first walked about openly, but at last was apprehended, and died of a natural disease in the Tower. See GUY FAWKES.

GUNSAULUS, Frank Wakeley, American clergyman and educator: b. Chesterville, Ohio, 1856, Jan. 1. He was graduated at the Ohio Wesleyan University in 1875, was ordained to the Methodist ministry, but became a Congregationalist. He was pastor of Congregational Churches at Columbus, Ohio (1879–81), Newtonville Mass. (1881–5), and Baltimore, Md. (1885–7). In 1887 he became pastor of Plymouth Church, Chicago, and from 1899 of the Central Church of that city. Since 1899 he has been president of the Armour Institute of Technology, Chicago. He is well known as a platform lecturer, and has published *Monk and Knight* (1891); *Phidias* (1893); *Gladstone* (1898); *The Man of Galilee* (1899); *Paths to Power* (1905); and other works.

GUN'SHOT WOUNDS: wounds produced by projectiles from a gun; varying in severity from a simple bruise to the tearing away of a whole limb. Single balls produce a cut, bruised or lacerated wound, according to the amount of their velocity when they strike the body. The effects of small-shot vary with the distance and power of the gun; when close, the charge enters with the pellets so close together as to make one wound like a single ball. Some years ago, it was commonly believed that the 'wind of a large shot' could produce serious injuries; this belief may have arisen from the circumstance that when a heavy ball, which has lost some of its force, strikes the body at a particular angle, the skin does not always give way, but the deeper structures, such as the muscles, or large organs, as the liver, may be completely crushed. If the wind of a shot could kill a man, it is not likely that soldiers should have had ears, noses, and lips shot off, and yet have experienced only the symptoms produced by those slight injuries.

When a bullet passes out of the body, there are two openings—of 'entrance' and of 'exit'; and the first is generally depressed, round, regular, and smaller than the last. The modern conical ball makes a well-defined oblong wound, but it may shift its direction, so as to strike longitudinally, and cause a more extensive injury to the skin. When a bullet strikes the shaft of a bone, it cracks or splinters it, and either remains or passes through the cancellated ends. In its course, the ball may carry before it pieces of cloth, coins, or other foreign bodies, which increase the danger of the wound. Many persons who have been shot during the excitement of battle, describe the sensation as resembling the sharp stroke of a cane; but in most instances the wounded man soon begins to tremble, as if in an ague fit, complains of cold, his face becomes pale, his pulse scarcely perceptible, and he appears as if about to die. This is the condition termed *shock;* and though death sometimes does ensue during this state of prostration, it is not so serious as it appears, and the patient will probably pass out of it in a few hours with the help

of stimulants and rest. Although excessive bleeding is not so common after gunshot as other kinds of wounds, it may occur immediately to a fatal extent, if assistance be not afforded. This assistance any one can give: it consists simply in placing the fingers in the wound, and if the vessel can be reached, pressing them upon it, directed to the proper point by the warm gush of blood. Should the wound be too small to admit the finger, a handkerchief may be tied round the limb above the wound, and twisted tightly with a stick. It is well to examine the wound, to ascertain the extent of the injury, and whether there are splinters of bone or portions of dress lying in it, which should be removed. But neither the examination nor the removal should be attempted if they seem likely to aggravate the injury. The treatment is similar to that of other wounds, and consists in protecting the part during the healing stages, moderating inflammation by cold-water dressings or soothing poultices, and hastening the last stages of cure by stimulating lotions.

GUNTER, *gŭn'tẽr*, ARCHIBALD CLAVERING. American author: b. Liverpool, England, 1847, Oct. 25; d. New York 1907, Feb. 23. He was a mining and civil engineer in the West from 1867 until 1875, when he became a stock broker at San Francisco. In 1878 he removed to New York, where he devoted himself to writing plays and novels. The best known of the former are: *Courage; Prince Karl;* and *The Deacon's Daughter.* His works of fiction, sensational volumes, largely without literary merit, include: *Mr. Barnes of New York* (1887); and *Mr. Potter of Texas* (1888); both successfully dramatized; *That Frenchman* (1889); *Miss Nobody of Nowhere* (1890); *Baron Montez of Panama and Paris* (1893); and *Adrienne de Portalis* (1900).

GUNTER, EDMUND: English mathematician: b. in Hertfordshire, in the end of 1580 or the beginning of 1581; d. 1626, Dec. 10. He was educated at Westminster School, and afterward at Christchurch College, Oxford. While at Oxford, he gave his attention principally to the study of mathematics, and in 1606 invented the sector, with the lines known as Gunter's Scale (q.v.). Subsequently, he took orders, became a preacher, and took the degree of B.D. But the bent of his mind being strongly toward mathematical studies, he obtained the professorship of astronomy in Gresham College, 1619, Mar. 6. His principal works are *Canon Triangulorum* (Lond. 1620), a table of logarithmic sines, etc., to seven places of decimals, being the first table published in accordance with Briggs's system; in this work, we find for the first time the words '*co*sine,' '*co*tangent,' etc.; Of the *Sector, Cross-staff, and other Instruments* (1624). We owe to Gunter the invention of the surveying chain (see GUNTER'S CHAIN), and the first observation of the variation of the compass.

GUNTER'S CHAIN, *gŭn'tcrz chan:* surveyor's measure, named after the inventor (see GUNTER, EDMUND), consisting of a series of iron links, usually 100, each being 7.92 inches in length, or 66 ft. in total length; its convenience in practice turns on the fact that 10 square chains make one acre. GUNTER'S SCALE, *-skāl,* or GUNTER'S LINES, name given to three lines seen on almost any sector, and marked N, S, T, meaning the lines of logarithmic *numbers,* of logarithmic *sines,* and of logarithmic *tangents.* To understand their construction and use requires a knowledge of logarithms; they are explained in every school-book of practical mathematics. The distances of the divisions marked 1, 2, 3, etc. on the line of logarithmic numbers, represent the logarithms of those numbers—viz., 0, .301, .477, etc.—taken from a scale of equal parts. The other lines are constructed on an analogous plan. Calling to mind that multiplication of numbers is effected by the addition of the logarithms, division by their subtraction, involution by their multiplication, and evolution by their division, we are able to perceive with what ease many *rough* problems in areas, height, cubic contents, and other matters may be performed by means of this scale.

GÜNTHER, SIEGMUND, German geographer and mathematician: b. Nuremberg, 1848, Feb. 6. Educated at several German universities he became professor of geography in the School of Technology at Munich, in 1886. Among his many valuable professional works may be named *Lehrbuch der Determinatentheorie* (1875): *Parabolische Logarithmen und parabolische Trigonometrie* (1882); *Die Meteorologie ihrem neuesten Standpunkt gemäss dargestellt* (1889); *Lehrbuch der physikalischen Geographie* (1891).

GUN'TON, GEORGE, American economist: b. Cambridgeshire, Eng., 1845, Sept. 8. He came to the United States in 1874, and until 1880 was a writer on economic subjects. He then turned his attention to sociological and economic work, and in 1890 became president of the Institute of Social Economics and editor of the *Social Economist,* which in 1896 became *Gunton's Magazine.* His publications include *Wealth and Progress* (1887); *Principles of Social Economics* (1891); *Trusts and the Public* (1899); *Outlines of Political Science* (1900); *Outlines of Social Economics,* etc.

GUNTOWN, BATTLE OF. After Gen. Forrest's capture of Fort Pillow, 1864, April 12, Gen. Sturgis was ordered to march from Memphis to intercept him, but before the expedition got fairly under way, it was ascertained that Forrest had fallen back to northern Mississippi. On June 1, Sturgis started from White's Station near Memphis, with about 5,500 infantry and artillery, under Col. McMillan, and 3,400 cavalry, under Gen. Grierson, to defeat Forrest and prevent his interference with Sherman's advance on Atlanta. Moving

southward, Sturgis reached Ripley, 80 miles from Memphis, on the 8th, and on the 10th struck the Mobile & Ohio Railroad near Guntown, Miss., where Grierson, in advance with the cavalry, met Forrest's cavalry near Brice's Cross-roads, and became immediately engaged. Sturgis, who was six miles in rear with the infantry, moved on the double-quick, followed by a train of 250 wagons and, coming to where Grierson was engaged, without giving his exhausted men a moment's rest, and badly handling them, threw them into the fight. In three hours' time Forrest routed him, drove him from the field in confusion, captured prisoners, guns, and wagons, and closely pursued him to near Ripley. There, early on the morning of the 11th, his rear-guard, taking advantage of a small stream, after a sharp fight checked Forrest, and Sturgis continued his retreat to Memphis, having lost 23 officers and 594 men killed and wounded, 1,623 prisoners, 14 guns, and his entire train of 250 wagons with 10 days' rations and a large supply of ammunition. Forrest's engaging force did not exceed 4,000 men; his loss was 492 killed and wounded. Consult *Official Records*, Vol. XXXIX.

GURGE, n. *gėrj* [L. *gurgēs*, a whirlpool]: in *OE.*, a whirlpool; a gulf: V. to swallow up. GUR'GING, imp. GURGED, pp. *gėrjd.*

GURGEONS, n. plu. *gėr'jŭnz* [F. *gruger*, to granulate, to crumble: Dut. *gruizen*, to reduce to small bits]: that part which remains after the fine meal has passed the sieve; the siftings of meal: see under WHEAT.

GURGINA BALSAM, *gėr-ji na bawl'sam*, or WOOD OIL: balsamic liquid, obtained from the Gurjun tree (*Dipterocarpus turbinatus*). See DIPTERACEÆ; WOOD OIL.

GURGLE, v. *gėr'gl* [L. *gurgēs*, a whirlpool; *gurgŭlĭō*, the windpipe, the gullet: an imitative word]: to flow with an irregular bubbling noise, as water in a small pebbly stream, or from a bottle. GURGLING, imp. *gėr'glĭng:* ADJ. running or flowing with a broken bubbling noise: N. a gushing or flowing with a broken, bubbling, or clucking noise. GURGLED, pp. *gėr'gld.*

GURGOYLE. See GAR'GOYLE.

GURNARD, n. *gėr'nėrd;* sometimes GURNET [OF. *gournauld*—from *grogner*, to grumble: F. *grognard*, grunting], (*Trigla*): genus of acanthopterous marine fishes of the family *Sclerogenidæ*, containing a considerable number of species. The head in the gurnards is angular, and wholly covered with bony plates; the body is elongated, nearly round, and tapering; there are two dorsal fins; the pectoral fins are large; the teeth are small and numerous. Many are notable by beauty of color. They are supposed to have received the name gurnard from the sound which they sometimes emit, particularly when newly taken out of the water, and

which has obtainer for one or two species the local name of *Piper*. M. Dufossé, ascribes the sound to the vibration of muscles connected with the air-bladder, and has assigned to the notes produced by different species their particular places in the musical scale. Most of the gurnards live generally near the bottom, and are caught either by the trawl-net or by hook and line, a shining piece of sand-eel being a very captivating bait. Although not among the finest of fishes, they are good for the table. The RED GURNARD (*T. cuculus* or *T. pini*) is seldom more than 15 or 16 inches long; of rose-red color, the body marked on the upper part with fine transverse lateral ridges. A larger and more valuable species sometimes two ft. long. is the SAPPHIRINE GURNARD (*T. Hirundo*), remarkable for the large size of its pectorals and the blue of their inner surface. The GRAY GURNARD (*T. gurnardus*) is a common species, generally of a gray color, more or less clouded or spotted with brown, black and yellowish-white. There are numerous species in the Mediterranean.

GUR'NEY, ELIZABETH. See FRY, ELIZABETH.

GURNEY, *gėr'nĭ*, JOSEPH JOHN: 1788, Aug. 2—1847, Jan. 4; b. Earlham Hall, near Norwich, England: philanthropist. He was educated privately at Oxford, and 1818 became a minister of the Society of Friends. His life was devoted to benevolent enterprises. Gurney wrote among many works—*Notes on Prison Discipline* (Lond. 1819); *Observations on the Religious Peculiarities of the Society of Friends* (1824); *A Winter in the West Indies described in Familiar Letters to Henry Clay of Kentucky* (1840).

GUROWSKI, *gô-rŏv'skē*, ADAM, Count DE: 1805, Sep. 10—1866, May 4; b. Kalisz, Poland: author. He was expelled from the Warsaw gymnasium for his revolutionary sympathies, studied 5 years in German universities, returned to Warsaw and was several times imprisoned, was a leader in the organization and conduct of the revolution 1830, lost his estates, was condemned to death, and escaped to Paris on the suppression of the revolt, was recalled to Russia and employed in the civil service 1835, resumed study in Heidelberg Univ. 1844, and came to the United States 1849. He spent several years in lecturing and teaching languages of 8 of which he was master, and was translator in the state dept. Washington 1861–63. His publications include *La Vérité sur la Russie* (1835); *La Civilisation et la Russie* (1840); *Pensées sur l'avenir des Polonais* (1841); *Impressiones et Souvenirs* (1846); *Le Panslavisme* (1848); *Russia as it Is* (1854); *The Turkish Question* (1854); *A year of the War* (1855); *America and Europe* (1857); *Slavery in History* (1860); and *My Diary*, civil war notes, 3 vols. (1862–66).

GURRY, n. *gŭr'rĭ:* a small fort in India.

GURT, n. *gėrt* [a corruption of GUTTER, which see]: in *mining*, a gutter or channel for water, usually hewn out of the pavement or bottom of a working drift.

GUSSET, n. *gŭssĕt* [F. *gousset*, a fob, the arm-pit—F. *gousse;* It. *guscio*, the pod or husk as of peas]: in *armor*, a piece at first of chain, and afterwards of plate armor, intended as a protection to the vulnerable point where the defenses of the arm and breast left a gap; triangular piece of cloth put into a garment to enlarge or strengthen a part: in *mech.*, an angular piece of iron to unite parts, or to give strength and stiffness to the angular parts of a structure: in *heraldry*, one of the abatements or marks of disgrace for unknightly conduct. It is represented by a straight line extending diagonally from the dexter or sinister chief point one-third across the shield, and then descending perpendicularly to the base. Heralds tell us that a gusset dexter indicated adultery; a gusset sinister, drunkenness. Cowardice was indicated by the gore sinister (see GORE), which, though somewhat similar, we are told carefully to distinguish from the gusset. According to Guillim, gores and gussets 'are thing in use among women, especially semsters, and therefore are fit notes of cowards and womanish dispositions.'

GUSSET or GUSSET STAY. A triangular piece of wrought-iron or steel employed to support the flat ends of boilers. Large boilers are provided with five gusset stays at each end, which are secured to the end-plates and the shell by angle-irons.

GUSH, n. *gŭsh* [Ger. *giessen;* Dut. *gosselen*, to pour: Icel. *gusa*, to spirt out, to gush: Gael. *gais*, a torrent: Swiss, *gusseln*, to dabble in wet]: a sudden and violent flowing out of a liquid from an inclosed place; a sudden flow: V. to rush as a fluid from confinement; to issue with force and rapidity. GUSH'ING, imp.: ADJ. breaking forth with a gush or rush; exuberant: demonstrative: N. a rushing forth with impulsive force. GUSHED, pp. *gŭsht.* GUSH'INGLY, ad. *-lĭ.*

GUST, n. *gŭst* [Icel. *gustr*, a cold blast of wind: Gael. *gaoth*, the wind]: a sudden blast of wind; a sudden violent burst of passion. GUSTY, a. *gŭs'tĭ*, subject to gusts; stormy; hasty or fitful in temper.

GUST, n. *gŭst* [L. *gustus*, taste, flavor: It. *gusto:* F. *goût*]: sense of tasting; relish; intellectual taste: V. in *OE.*, to taste; to have a relish of. GUS'TABLE, a. *-tá-bl*, pleasant to the taste. GUS'TATORY, a. *-tėr-ĭ*, pertaining to the taste; tending to please the taste. GUS'TO, n. *-tō* [It]: relish; that which excites pleasant sensations in the palate and tongue. GUST'FUL, a. tasteful. GUST'FULNESS, n. tastefulness; the relish of a thing.

GUSTATORY SENSATIONS, *gŭs'ta-to'rĭ* [L. *gusto, gustus*, taste]: those conscious experiences which result when the organs of taste are excited by various sub-

stances. The organs of taste are sensory cells situated in various parts of the mouth, especially on the papillae of the tongue. The cells are arranged in small groups known from their collective form as taste bulbs. These bulbs are more or less differentiated in their functions so that the front of the tongue is especially sensitive to sweets, the back to bitters, the sides to salts and sours. Substances must be in liquid form to affect the taste bulbs. The manifold of taste experiences may be reduced to the four fundamental qualities referred to above, namely, sweet, bitter, sour, and saline. Metallic tastes and alkaline tastes are sometimes regarded as fundamental, but more commonly recognized as compounds.

GUSTAVUS, *gŭs-tā'vŭs*, I. (known in history as GUSTAVUS VASA, but designated before his accession to power, by himself and others, GUSTAVUS ERICSSON), King of Sweden: 1496, May 12—1560 (reigned 1523–60); b. at Lindholm, Sweden. As the descendant of an ancient Swedish family, which had given members to the national diet for nearly 200 years, and which had been distinguished for opposition to Danish supremacy, Gustavus was involved at an early age in the unfortunate domestic wars of that period; and the future king was active in the defense against Christian II. of Denmark, who, 1517, in person commanded an assault on Stockholm, with the object of compelling the Swedish administrator, Svante Sture, and his senate to acknowledge him as king of Sweden. When famine compelled Christian to relinquish the siege, he had recourse to fraud; and having enticed a deputation from the senate, among whom was Gustavus, on board his ship, he set sail, and treacherously carried his cáptives to Denmark, where Gustavus spent a year in confinement in the custody of his maternal relative, Erich Baner, Lord of Kalloe, in Jutland. While under confinement, Gustavus heard such alarming rumors of the expedition which the king was preparing against Sweden, that, irritated beyond endurance, he broke his parole, and escaped in the disguise of a pilgrim, or according to others, as a drover, and after encountering numerous dangers, reached Lubeck (1519, Sep.), whence he was with difficulty conveyed to Sweden, where he landed 1520, May, near Calmar, the only place of note, except Stockholm, that still held out against the Danes. Gustavus made his way into the castle of Calmar, which was defended by foreign mercenaries; but as his admonitions to the garrison to show more zeal in their defense were met by threats of delivering him to the Danes, he left Calmar and took refuge among his father's peasantry in Smaaland. The Smaalanders had, however, already taken the oaths of allegiance to the envoys who had been sent through the country by Christian II. to ascertain the sentiments of the people, and Gustavus was soon compelled to retreat to Dalecarlia, where he wandered for several months, in poverty and disguise, with a price

set on his head, and finally made his way, penniless and almost naked, to the house of his brother-in-law, Joachim Brahe, just as the latter was preparing to obey the summons of Christian II. to attend his coronation. Having failed to dissuade Brahe from attending this ceremony, 1520, Nov., Gustavus retired to his father's property of Räfsnäs, where he remained till he heard of the massacre known as the Bloodbath, in which, three days after the coronation, on the plea of their being enemies of the true church, the greater number of the nobles and leaders of Sweden, including Brahe himself and Gustavus's father, Eric Johansson, were slaughtered in cold blood. Gustavus then retreated to the less frequented parts of Dalecarlia, where for a time he earned his living as a field-laborer, and more than once owed his life and safety to the generosity of the peasant-women of the district. This period of his life has been so long the subject of traditionary lore and romance, that it is difficult now to separate the true from the false; but the fame of his supposed adventures still lives in the minds of the people of Sweden, who cherish as sacred every spot associated with his wanderings and dangers. His appeals to the Dalecarlians met no success, until his account of the tyranny of the Danes was corroborated by the testimony of several fugitives from Stockholm, when a reaction followed, the national enthusiasm was roused, and the men of Dalecarlia, having called together a diet at Mora, proclaimed him head of their own and other communes of Sweden.

This was the turning-point in his life, for the peasantry now flocked around him from every side; and before another year had passed many of the strongest posts of the enemy had fallen into his hands, and he was able to enter upon the siege of Stockholm, which terminated 1523, when Christian II. was compelled by his enraged subjects to resign the crown and retire from Denmark. His forcible abdication brought the Scandinavian union to a sudden close, after it had existed for 126 years; for when Frederick I., successor of Christian, demanded his recognition in Sweden, conformably to the Union of Calmar, the Swedes declared at the diet of Strengnaes that they would have no other king but Gustavus Ericsson. But although Gustavus was at once recognized as king, he was not crowned till two years later, in consequence of his unwillingness to receive the crown from the hands of the Rom. Cath. bishops. The king early showed his determination to favor the Lutheran doctrines, and to cripple the power of the Roman clergy, on whom he laid a large proportion of the heavy imposts to meet the expenses of the war; and though his opinions were for a long time not favorably received by the people, he finally succeeded in establishing the Reformation in Sweden.

The disaffection of the peasantry, who threatened to destroy the nobility, and the imprudence of the Lu-

theran clergy, who tried to force the people to adopt the reformed doctrines, combined to thwart many of Gustavus's schemes for the improvement of the country; and his latter years were imbittered by the jealousy and dissensions of his sons, Eric and John. Yet Gustavus effected more than any other Swedish monarch for the welfare of the people. He had found Sweden a wilderness, devoid of cultivation, and a prey to the turbulence of the people and the rapacity of the nobles; and after 40 years' rule, he left it a peaceful and civilized realm, with a full exchequer, and with a well-organized army of 15,000 men and a good fleet, which both were his creations. He promoted trade at home and abroad. Every profession and trade received his attention and fostering care, and schools and colleges owed to him their revival, after the decay of the older Rom. Cath. institutions. He made commercial treaties with foreign nations, and established fairs for foreign traders. In his reign, roads and bridges were made in every part of the country, and canals begun, one of which has only recently been brought to completion. In his relations with his subjects, Gustavus was firm, sometimes severe, but seldom unjust, except in his dealings toward the Roman clergy, whom he despoiled with something like rapacity of all their lands and funds. He promoted Lutheranism, but took care that the reformed clery should be dependent on the crown, and receive only very moderate emoluments. To him the various tribes of Lapps were indebted for the diffusion of Christianity among them by Lutheran missionaries; while the Finns owed to him the first works of instruction, Bibles and hymn-books printed in their own language. Gustavus was methodical, just, moral, and abstemious in his mode of life; an able administrator; and with the exception of a tendency to avarice, his qualities were worthy of esteem. His religious intolerance was in large part the spirit of his age. He was three times married, and had ten children. The name Vasa, which has been supposed an ancient patronymic in his family, but erroneously, since surnames were not in use among the Swedish nobility until a later date, was adopted by him subsequently to his accession, and is conjectured by the historian Gejer (q.v.) and others to have been derived from his heraldic arms, which bore originally a black fascine used in storming, and afterward drawn like a vase, but changed by Gustavus to yellow, whence it came to be mistaken for a sheaf. By an act of the diet of 1544, at Westeraas, the crown was declared hereditary in the male descendants of Gustavus; in conformity with which his eldest son Eric (q.v.) succeeded to the throne.

GUSTA'VUS II., or GUSTA'VUS ADOL'PHUS, King of Sweden: 1594, Dec. 9—1632, Nov. 6 (reigned 1611–32); b. Stockholm: grandson of Gustavus Vasa, by that king's youngest son, Charles IX., at whose death, Gustavus

succeeded to the throne. Gustavus had been strictly brought up in the Lutheran faith, and carefully trained in habits of business, and was one of the most accomplished princes of his age. He was acquainted with eight languages, five of which he spoke and wrote fluently, was well read in the classics and ancient history, a proficient in music, and excelled in all warlike and manly exercises. At his accession to power, he found the country involved in wars abroad, and disorders at home, arising from the disputed succession of his father who had been elected king on the exclusion of his nephew, Sigismund, King of Poland, the direct heir, whose profession of the Rom. Cath. religion made him obnoxious to the Swedish people, and virtually annulled his claims to the crown. The first act of Gustavus was to secure the hearty co-operation of the nobles, whose privileges he confirmed and made dependent on the performance of military service to the crown, and thus laid the foundation of an essentially feudal or military form of government, in which the nobles held their lands directly, and the peasantry indirectly, under the crown. In addition to these two bodies, which had formerly constituted the national diet, Gustavus for the first time admitted special delegates of the army into the assembly as assessors to the nobles. Having thus organized the internal government, and succeeded in levying heavy imposts and raising some companies of efficient troops, he inaugurated his military career by a war with Denmark, which at that time occupied the Baltic districts of the Swedish territories, and thus completely cut off the Swedes from direct communication with the continent of Eastern Europe. The war continued for a year, and terminated in a peace by which Gustavus renounced his claims on the Lappish districts and other disputed territory, and recovered possession, under certain conditions, of Calmar, Oeland, Elfsborg, and the province of Gottenborg.

Having thus gained an outlet on the Baltic, secured a peaceful ally in the king of Denmark, and concluded an alliance with the Netherlands, Gustavus turned his attention to the Russian war, which, after fluctuating success, was concluded 1617, by the treaty of Stolbova, by which Sweden obtained supreme dominion over Ingermanland and Karelia, and part of Lifland, while Russia recovered Novogorod and all other conquests made by the Swedes. The boundary of the Swedish territory, which then included the site of the future St. Petersburg, was marked, after the peace by a stone which bore the three crowns of Sweden above a Latin inscription, recording that it marked the limits of the dominions of Gustavus Adolphus, king of Sweden. The disputes with Poland, however, remained undecided; and in 1621, war was declared between the two countries, and continued with occasional intermission, till 1629, when it terminated in a six years' truce, which was settled by a

treaty that secured reciprocity of trade and freedom of religion to the natives of both countries, and left Gustavus master of Elbing, Braunsberg, Pillau, and Memel.

This peace enabled Gustavus to mature the plans that he had long cherished in regard to Germany; and having made various administrative reforms, and availed himself of the short interval of peace to promote the material prosperity of the country, he remitted the government, and the care of his infant daughter Christina, to his chancellor Oxenstiern, and set sail, in the summer of 1630, with an army of about 15,000 men, to aid the Protestants of Germany in their hard struggle against the Rom. Cath. League, which was backed by the power of the empire.

Everything favored the success of the Swedes, who drove the imperialists from Pomerania, and took Stettin. The childless Duke of Pomerania engaged, in return for Swedish aid, that the dukedom should, after his death, be given up to Sweden, until the expenses of the war were fully repaid; while France, through hatred of the empire, agreed to furnish Gustavus with a subsidy of 400,000 rix-dollars as long as he maintained an army of 36,000 men. Wallenstein had retired from the service of the emperor. But while the Swedes were besieging Spandau and Küstrin, the city of Magdeburg, which had applied to Gustavus for assistance, was taken 1631 by the imperial general, Tilly, whose troops perpetrated the most terrible atrocities against the unfortunate inhabitants. Although Gustavus could not save Magdeburg, he soon after its fall inflicted a defeat on the imperialists at Breitenfeld, which excited the respect and fear of the Rom. Catholics, who thenceforward ceased to despise the 'snow-king and his body-guard,' as they designated Gustavus and his small army. The king now advanced into Franconia, and after allowing his army to recruit their strength in the rich bishopries of Würzburg and Bamberg; took the Palatinate and Mainz, where he held a splendid court, surrounded by numerous princes and ambassadors. In the spring of 1632, the Swedes, in the face of Tilly's army, crossed the Danube, and gained a decisive victory at Ingolstadt, where Tilly was mortally wounded. Thence the march to Munich was one continued triumph, and wherever Gustavus appeared he was received by the populace as their guardian angel. The road to Vienna was now open to him, and the fate of the emperor would have been sealed, had the emperor not recalled his general, Wallenstein, who, having accepted office on his own terms, gathered a large army, with which he advanced on Nürnberg; but after standing a desperate assault of the Swedes, he was obliged to retire into Thuringia. The unfavorable season and the bad roads hindered Gustavus from attacking the imperialists at the time which he had intended; but 1632, Nov. 6, the two armies came finally face to face at Lützen. As usual, the Swedes began by singing

Luther's hymn, *Einefeste Burg ist unser Gott*, and a hymn composed by the king. Gustavus then made an address to the army, and swinging his sword above his head, he gave the word of command, and with the cry of 'Onward!' he rushed forward followed by the eager troops, who were commanded jointly by himself and Bernhard of Saxe-Weimar. Victory was already on the side of the Swedes, when a strong reinforcement of imperialists appeared under the command of Pappenheim. Gustavus seeing that his troops wavered under this fresh attack, rode hastily forward, when, having come too near a squadron of Croats, he received a shot in his arm, and, as he was turning aside, another in the back, which caused him to fall from his horse. The sight of the riderless animal spread dismay and fury among the Swedes; but before they could advance to his rescue, a party of Croats had thrown themselves between the king and his army; and it was not till after many hours' hard fighting, and when the field was strewn with 10,000 dead and wounded, that the Swedes recovered the body of their king, which had been plundered, stripped, and covered with wounds. The artillery of the enemy fell into the hands of the Swedes, who remained masters of the field, after having fought with an impetuosity that nothing could resist. A rumor long prevailed that the shot in the back which caused the king to fall was from the hand of Albert, Duke of Saxe-Lauenburg, but no just ground appears for the suspicion.

Although Gustavus was eminently a warlike king, he made many salutary changes in the internal administration of his country, and devoted his short intervals of peace to the promotion of commerce and manufactures. He was pre-eminently religious, and his success in battle is perhaps to be ascribed not only to a better mode of warfare, and the stricter discipline which he enforced, but also still more to the moral influence which his deep-seated piety and his personal character inspired among his soldiers. He was one of the greatest and noblest figures in history. In the art of war he was a recognized master. The spot where he fell on the field of Lützen was long marked by the *Schwedenstein*, or Swede's Stone, erected by his servant, Jacob Erichsson, on the night after the battle. Its place has been taken by a noble monument erected to his memory by the German people 1832, on the occasion of the second centenary of the battle.

GUSTA'VUS III., King of Sweden, 1746–1792, Mar. 29 (reigned 1771–92); b. Stockholm; son and successor of Adolphus Frederick. His reign began when the country was distracted by the intrigues of the rival political parties of Horn and Gyllenborg, known as the 'Hats' and 'Caps.' Finding that the people, thoroughly wearied with the misrule of the nobles, were ready for any change, Gustavus covertly fomented the general discontent, and having raised a fictitious rebellion, through

the agency of his friend and adherent, Captain Hellichius, he collected a large body of troops, on pretense of restoring order, and having arrested the council in a body, convoked the diet, and laid before it a newly framed constitution, to which the assembly was compelled to subscribe. A revolution was thus effected without the shedding of blood, and by a stroke of the pen Gustavus recovered all the legal powers that had been gradually lost by his immediate predecessors. Gustavus acted with great moderation after this successful *coup d'état;* and he might have long retained the advantages that he had gained, if his love of display, and his wish to emulate the king of France in extravagance and magnificence, had not led him into profuse expenditure which embarrassed the finances; at the same time, the introduction of the manners and usages of Versailles at his own court irritated the national party, while it undoubtedly tended to demoralize the upper classes, and through them the nation generally. In 1788 he engaged in war with Russia, at the moment that the empire was engaged in active hostilities against the Turks, but derived no advantages from the contest. On the breaking out of the French Revolution, he combined with the other monarchs against France, and applied to the diet for funds to assist the Bourbons. His repeated applications having been decisively rejected, the nobles, among which he had many enemies, took advantage of his general unpopularity, and entered into a conspiracy against him, the leaders of which were Ribbing, Horn, and Pechlin; and 1792, Mar. 16, Gustavus was mortally wounded by their agent, Capt. Ankarström (q.v.), at a masked ball in the opera-house which he had himself built. The pistol had been loaded with broken shot, which rendered the wound especially painful, and the king suffered dreadful agony for 13 days until his death.

Gustavus was a man of varied learning, and author of several dramatic works and poems of considerable merit. His writings have been published in a collective form in Swedish and French. Certain papers deposited by him 1788 in the library of Upsala—not to be opened for 50 years after his death—were published 1842, but have little interest or value.

GUSTA'VUS IV.: 1778, Nov. 1—1837 (reigned 1792–1809); son and successor of Gustavus III. His uncle, Duke of Sudermania, acted as regent during his minority. The young king, on his accession to power, at once gave evidence of the high estimate at which he held the kingly power, and his first act was to join the third coalition against France, contrary to the wishes of his people. Hatred of Napoleon soon, however, became the guiding influence of his life: Gustavus was under a firm conviction that Napoleon was the Great Beast predicted in the Apocalypse. The result of his decided line of policy led to the occupation of Swedish Pomerania by

French troops under Marshal Brune, who took Stralsund and Riga from the Swedes 1807, and thus deprived them of the last of their German possessions. The king opened all his ports to English vessels, and thereby involved himself in a war with Russia. The scene of these hostilities was Finland, which the Swedes were obliged to give up to Russia at the close of 1808. Norway became next the scene of war, the Swedes being assisted by an English subsidy of 10,000 men, who, however, speedily returned to England when they found that Gustavus intended to send them to Finland. The unfortunate war with Russia, which had been excited entirely through the folly of the king, gave rise to so much discontent in Sweden, that a conspiracy was set on foot by several officers and nobles, the object of which was to dethrone the unpopular monarch. The conspirators took forcible possession of the palace at Stockholm, and placed him under arrest; and after an ineffectual attempt at escape, he consented to abdicate the throne, 1809, Mar. 29. After wandering for a time from place to place, under the name Colonel Gustavson, he finally settled at St. Gall, where he died, forgotten and in poverty, 1837. His uncle, the Duke of Sudermania, after acting as regent of the kingdom, was finally proclaimed king, under the title of Charles XIII., at the diet which met 1809, May. By the consent of the diet, Charles XIV. (Bernadotte) paid over the value of the private estates of the family of Vasa for the benefit of Gustavus and his children; but as the dethroned king refused to receive any of this money directly, or to accept the pension which the Swedish government had settled upon him, he was often in pecuniary difficulties, from which he was clandestinely relieved by his divorced queen and children, who contrived, without his knowledge, to supply his wants.

GUSTA'VUS ADOL'PHUS UN'ION: assoc. conceived by Dr. Grossmann of Leipsic and organized 1832, Nov. 6 at Lützen, at the 200th celebration of the death of the Prot. hero, for the purpose of assisting feeble congregations of evangelical Protestants in any part of the world. The founders deemed such an assoc. a more appropriate memorial to Gustavus Adolphus than any monument. The assoc. was recognized and its purposes and rules were confirmed by the king of Saxony 1834, Oct. 4: and since then with annual receipts of about $150,000 it has established 43 minor assocs., with 1,160 branches, 8 students', and 371 women's assocs., and has built 1,068 churches, 639 school-houses, and 358 parsonages. It is exceedingly popular in Protestant parts of Germany, Sweden, and the Netherlands.

GÜSTROW, *güs'trŏv:* town of Mecklenburg-Schwerin, long the residence of the princes; on the left bank of the Nebel, 27 m. s. of Rostock. Among the principal buildings are the gymnasium, the old castle (now the

work-house) the fine Gothic cathedral, and the town-house. The former ramparts have been converted into pleasant gardens. Güstrow carries on distillation and beer-brewing and has several water-mills. Pop. (1900) 16,882.

GUT, n. *gŭt* [Icel. *gutla*, to sound as a liquid agitated in a cask: Low Ger. *küt*, guts, bowels: Dut. *kuit*, spawn or roe of fish: Scot. *kyte*, the belly: Swiss, *gudeln*, applied to the rumbling of the bowels]: the intestinal canal reaching with many convolutions from the stomach to the anus; a passage or strait; a substance made from a silk-worm, when ready to spin its cocoon, by pulling out and extending the silk part to a fine thread, and then hanging it up to dry: V. to take out the inside of anything; to plunder thoroughly. GUT'TING, imp. GUT'TED, pp. GUTS, n. plu. stomach; the intestines; receptacle for food; gluttony.

GUT, n. *gŭt* [Sw. *gjuta*, a mill-lead: Dan. *gyde*, a lane: O. Dut. *gote*, a channel]: in *OE.*, a wide ditch or water-course that flows into the sea; a strait or channel; a bay.

GUTENBERG, *gô'tėn-berċh*, JOHANNES, or HENNE (proper name, GENSFLEISCH, or GÄNSFLEISCH): regarded by the Germans as the inventor of the art of employing movable types in printing abt. 1410–1468, Feb. 2; b. Mainz; of a patrician family, which took the names of Gutenberg and Gensfleisch, from two estates in its possession—the former being the mother's name, the latter the father's. Of Gutenberg's early life no particulars are known, but it seems probable that he early applied himself to mechanical arts. In 1434, he was living in Strasburg, and there, 1436, made a contract with Andrew Dryzhen, or Dritzehn, and others, by which he bound himself to instruct them in all his 'secret and wonderful arts,' and to employ these for their common advantage. This undertaking, which comprehended the first steps in the art of printing, was frustrated by the death of Dryzehn, particularly as George Dryzehn, a brother of the deceased, commenced a lawsuit with Gutenberg, which was decided against the latter. When and where the first attempts in the art of printing were made, has not been ascertained, as the works printed by Gutenberg bear neither name nor date; this, however, is certain—that movable wooden types were first employed by him about 1438. In 1443, he returned from Strasburg to Mainz, where, in 1449 or 50, he entered into partnership with Johannes Faust, or Fust, a wealthy goldsmith. Faust furnished the money required to set up a printing-press, in which the Latin Bible was printed for the first time. This partnership was dissolved after a few years. Faust had made large advances, which Gutenberg was now to refund, but as he possessed neither the power nor the inclination, the matter was brought before a court of justice. The result

was that Faust retained the printing concern, which he carried on and brought to perfection, in conjunction with Peter Schöffer of Gernsheim. By the assistance of Conrad Hummer, a councilor of Mainz, Gutenberg was again enabled to set up a press, from which, in all probability, proceeded *Hermanni de Saldis Speculum Sacerdotum*, printed in quarto without date or name. According to some, four editions of the *Donatus* were likewise printed by Gutenberg, while others ascribe them to Faust and Schöffer. In 1457, appeared the Latin *Psalterium*, or rather a breviary containing psalms, with antiphones, collects, etc., and arranged for choruses for Sundays and holidays. This specimen of the art of printing, remarkable as being the first bearing the name of the printer and the locality, as well as the year and day of its completion, and valued by Dibdin at $50,000, was printed with an elegance which sufficiently proves the rapid progress that had been made in the newly invented art, and the diligence with which it had been prosecuted. Gutenberg's printing establishment existed till 1465 in Mainz. He died 1468, Feb. 2—the same year in which the abp., Elector of Mainz, appointed him one of his courtiers, and raised him to the rank of a noble, though others place his death at the close of the previous year. The evidence in favor of Gutenberg's being the inventor of printing, is considered by his countrymen conclusive. They adducc the testimony of Ulrich Zell of Hanau, who introduced the art into Cologne (1462), and who declares that 'this noble art was invented for the first time in Germany, at Mainz, upon the Rhine . . . by a citizen of Mainz, named John Gutenberg.' Similarly speaks Wimpfeling, a learned Alsacian (b. Strasburg, 1451, and partly contemporaneous with Gutenberg). 'In the year 1440, under the reign of Frederick III., an almost divine benefit was conferred on mankind by John Gutenberg, who first discovered the art of printing.' So, too, Trithemus (1462–1516). 'At this epoch, this memorable art (viz., of printing) was devised and invented by Gutenberg, a citizen of Mainz;' while Johann Schöffer, son of Peter Schöffer (the partner of Faust), in his preface to a German translation of Livy (Mainz 1505), expressly affirms that 'at Mainz originally the admirable art of printing was invented particularly by the ingenious Johann Gutenberg, 1450,' and that it was 'subscquently improved and propagated to posterity by the wealth and labors of Johann Fust and Peter Schöffer.' That Gutenberg may have received the first hints of his invention from the Dutch xylography, is not denied (see COSTER). Ulrich Zell himself admits this; but the invention of typography, and beyond all doubt of the printing-press, must be ascribed to the German.—Compare Oberlin's *Essai d'Annales de la Vie de Gutenberg* (Strasburg 1801); Née de la Rochelle's *Eloge Historique de*

J. Gutenberg (Par. 1811); Gama's *Essai Historique de Gutenberg* (Par. 1857); and Lamartine's *Gutenberg, l'Inventeur de l'Imprimerie* (Par. 1853).

GUTHRIE, Okla., the capital of the State of Oklahoma and the county-seat of Logan County, on the Cottonwood River and on the Atchison, Topeka & Santa Fe, the Chicago, Rock Island & Pacific, the Oklahoma Eastern, the M. K. & T., St. Louis & San Francisco, Fort Smith & Western, Denver, Enid & Gulf, and the St. Louis, El Reno & Southern Rys.

Industries, Etc.—Guthrie has a very large trade, and is especially noted as a wholesale distributing centre. It has planing, flour and cotton-seed oil mills, furniture and carriage factories, a foundry and machine shops, a broom works, a plow factory, creamery, railroad repair shops, novelty works, book bindery, etc.

Buildings, Educational Institutions, Etc.—Guthrie's chief buildings are the capital, Federal court and post-office building, the city hall, the Scottish Rite temple, Carnegie Library, and the Federal prison. The Carnegie Library (costing $25,000) is a noteworthy institution. The city possesses an excellent public school system, including a high school, Saint Joseph's Academy, and many private schools add to the city's educational facilities. A $50,000 county high school has just been built, and the Capitol University is located on a height overlooking the city on the west.

Government.—The city is governed by a mayor and a council of ten members elected biennially. The chief of police and all other city officers are chosen by the people. The city has electric lighting and owns and operates its own water-works, has several miles of paved streets, large gas plant and work has begun on a street railway.

History.—Guthrie dates its existence from the opening of the territory in 1889, and it was made the capital city one year later, in 1890. The city has had a rapid development and has had a rival in Oklahoma City, about 30 miles south. In 1906, June 16, President Roosevelt signed the bill admitting Oklahoma to the Union, and it was provided in the bill of admission that Guthrie should remain the capital of the state until 1908, but that no money should be expended on permanent State buildings until a definite location had been selected. Pop. (Federal census of 1900) 10,006; (1910 est.) 25,000.

GUTHRIE, James, LL.D.: 1792, Dec. 5—1869, Mar. 13; b. Nelson co., Ky. He studied law and practiced at Louisville; served for many years in the state legislature, both in the house and the senate, and was pres. of the convention by which the present constitution of the state was framed. He was sec. of the U. S. treasury 1853–57, and U. S. senator 1865–68, resigning in the latter year on acount of ill health. From 1860 till shortly

before his death, he was pres. of a railroad. He died at Louisville.

GUTHRIE, *gŭth'rĭ*, THOMAS, D.D.: pulpit orator, philanthropist, and social reformer: 1803, July 12—1873, Feb. 24; b. Brechin, Forfarshire, Scotland, where his father was a merchant and banker. He went through the curriculum of study prescribed by the Church of Scotland to candidates for the ministry at the University of Edinburgh, and gave two additional winters to the study of chemistry, natural history, and anatomy. Meanwhile, he was licensed as a preacher by the presbytery of Brechin 1825. He subsequently spent six months in Paris, studying comparative anatomy, chemistry, and natural philosophy. Returning to Scotland, he for two years conducted, on behalf of his family, the affairs of a bank agency in Brechin. In 1830, he became minister of Arbirlot, in his native county; and 1837 was appointed one of the ministers of Old Greyfriars parish in Edinburgh. Here his eloquence, combined with devoted labors to reclaim the degraded population of one of the worst districts of the city soon won for him high public estimation. In 1843, Guthrie joined the Free Church, and for a long series of years ministered to a large congregation in Edinburgh. In 1845–6, he performed a great service to the Free Church, in his advocacy throughout the country of its scheme for providing manses or residences for its ministers. Guthrie's zeal was not confined to denominational channels. He came forward, 1847, as the advocate of Ragged Schools (q.v.); and to him the rapid extension of the system over the kingdom is largely to be ascribed. He earnestly exerted himself also against intemperance and other prevailing vices. Guthrie had great rhetorical talent; and his style was remarkable for abundance and variety of illustrations. Few public speakers have ever blended solemnity and deep pathos so intimately with the humorous, his tendency to which has by some been deemed a fault. He was a warm-hearted philanthropist, in sympathy with all that tended to social improvement. Guthrie's most important works are—*The Gospel in Ezekiel, a series of Discourses* (A. and C. Black, Edin. 1855); *The Way to Life*, sermons (Edin. 1862); *A Plea for Drunkards and against Drunkenness*, pamphlet (Edin. 1856); *A Plea for Ragged Schools*, pamphlet (Edin. 1847), followed by a second and a third plea, the latter under the title of *Seed-time and Harvest of Ragged Schools* (Edin. 1862); *The City: its Sins and Sorrows* (Edin. 1857). Perhaps his *Pleas* furnish the best published specimens of Dr. Guthrie's eloquence. His graphic style undoubtedly added to the immediate popular effect of his oratory, but is not commended as a model: it is overladen with richness and rhetorical elaboration to the sacrifice of the beauty of simplicity. For some years before his death he acted as editor of the *Sunday*

Magazine, founded 1864, in which year he retired from his regular ministrations. His *Autobiography and Memoir* was published by his sons.

GUTHRIE, Thomas Anstey (F. Anstey), English humorist: b. Kensington, London, 1856, Aug. 8. He was graduated from Cambridge in 1875, and called to the bar in 1880, but never practised and has devoted himself to authorship, his books having been extremely popular both at home and in the United States. He is the author of *Vice Versa* (1882); *The Giant's Robe* (1883); *The Black Poodle* (1884); *The Tinted Venus* (1885); *A Fallen Idol* (1886); *The Pariah* (1889); *Tourmalin's Time Cheques* (1890); *Voces Populi* (1890); *Mr. Punch's Pocket Ibsen* (1893); *Puppets at Large* (1897); *Love Among the Lions* (1898); *The Brass Bottle* (1900); *A Bayard From Bengal* (1902); *Only Toys* (1903); etc.

GUTH'RIE, William: political, historical, and miscellaneous writer: 1708–1770, Mar.; b. at Brechin, Forfarshire, Scotland. He was educated at King's College, Aberdeen. At an early period he removed to London, where he worked hard for forty years as a man of letters. Among his various works are a *History of England* (3 vols. Lond. 1744–50), and *A Historical and Geographical Grammar* (1st ed. 1770; 24th ed. 1827), a manual of information which had immense popularity in its time.

GUTHRIE, William Norman, American Episcopal clergyman and author: b. Dundee, Scotland, 1868, March 4. He was graduated from the University of the South in 1889 and was professor of modern languages there 1889–90, and at Kenyon College, Ohio, 1892–3. He entered the Episcopal ministry in 1893, was rector of several Cincinnati churches, and since 1903 has been rector of Christ Church, Alameda, Cal. He has published: *Love Conquereth* (1890); *Modern Poet Prophets; Essays Critical and Interpretative* (1897); *Songs of American Destiny* (1900); *The Old Hemlock—Symbolic Odes* (1901); *The Christ of the Ages in Words of Holy Writ* (1903); *The City of St. Francis* (1907); etc.

GUTS MUTHS, *gôts môts*, Johann Christoph Friedrich: 1759, Aug. 9—1839, May 21; b. Quedlinburg, in Prussian Saxony: German instructor of youth. He studied at Halle, and subsequently became attached to Salzmann's institution at Schnepfenthal. There he applied himself to the elaboration, theoretical and practical, of Gymnastics (q.v.) as a branch of education; and from him it has passed into the curriculum of other German institutions. In 1793 Guts Muths published *Gymnastik für die Jugend*, which has become a classic on the subject, and the basis of all subsequent treatises. Guts Muths was distinguished also as a writer on geography.

GUTTA, n. *gŭt'tă* [L. *gutta;* It. *gotto;* F. *goutte*, a

drop]: a drop; concrete juice. GUT'TA SERENA, *-sĕ-rē'na* [L. clear drop]: old name for Amaurosis (q.v.), loss or decay of sight from palsy of the optic nerve. GUT'TATED, a. besprinkled with drops. GUT'TÆ, n. plu. *-tē*, in *sculp.*, pendent ornaments, like drops, attached to the underside of the Mutules (q.v.), and under the triglyphs of the Doric order. They are generally in the form of the frustum of a cone, but sometimes cylindrical. It is not clear what their origin may have been, whether, as the name indicates, they represent drops of water or icicles. Alberti calls them nails; and it seems likely that as many other parts of Greek architecture have been shown to be derived from structural conditions (see ENTABLATURE), these also should owe their origin to a similar cause. They were probably derived from the wooden pins or plugs, more commonly used than iron nails, and of which it is still usual to leave the ends projecting in any large wooden structure, such as the centering of a bridge. Whatever their origin, they were modified by the Greeks into a graceful ornament.

GUTTA-PERCHA, n. *gŭt'tă-pĕr'chă* [Mal. *gâtah*, gum; *percha*, the tree from which it is obtained]: substance in many respects similar to caoutchouc, is the dried milky juice of a tree, *Isonandra Gutta*, growing in the peninsula of Malacca and the Malayan archipelago. The tree belongs to the nat. ord. *Sapotaceœ*. It is very large, the trunk sometimes three ft. in diameter, though it is of little use as a timber tree, the wood being spongy. Its geographical distribution is very limited. The leaves are alternate, on long stalks, obovate-oblong, entire, somewhat leathery, green above, and of golden color beneath. The flowers are in little tufts in the axils of the leaves, small, each on a distinct stalk; the corolla having a short tube and six elliptical segments; they have 12 stamens and one pistil. The usual mode of obtaining Gutta Percha is most destructive. The finest trees are selected and cut down, and the bark stripped off; between the wood and bark a milky juice is found, which is scraped up into little troughs made of plaintain leaves.

The result of this very wasteful process is, that the gutta percha tree has been exterminated from various districts in which it was formerly abundant. Hence a method of tapping the juice by incision is coming into use. Unless this method prevails gutta percha will become one of the rarest of substances.

The crude substance is gray or reddish, and is mixed with fragments of bark, leaves, and other impurities, from which it is separated by washing with cold and then with warm water. This softens the gutta percha, and the impurities can be easily picked out. When pure it has a brown color; at the ordinary temperature it is hard and tough, and in not too thick pieces is

flexible like leather. It is elastic only to a very slight extent, and cannot be beaten out. It has little or no adhesion for other bodies, but its own cohesiveness is remarkable, a thin strip of it bearing a very considerable weight. When warmed it gradually softens, and then can be drawn into fine fibres, rolled into sheets, or molded. When heated to a sufficiently high temperature in the air it catches fire, and burns with a bright flame; heated in close vessels it gives off oily hydrocarbons and an acid liquor, so that gutta percha seems to consist mainly of carbon and hydrogen, with some oxygen, while nitrogen is absent, or present only in very minute quantities. Attempts have been made to resolve gutta percha into proximate constituents, and accordingly three substances extracted from it have been described. These are named respectively gutta, which is the chief constituent, and when pure is white and opaque; alban, a white oxygenated crystalline substance; and fluavil, also oxygenated, and of a yellow color. These two are said to be formed from the first by oxidation, but there is a considerable diversity of opinion on the nature of these bodies. Ordinary gutta percha is insoluble in water, partially in alcohol and ether, readily and completely in chloroform, turpentine, benzol, bisulphide of carbon, and naphtha. It is also dissolved to a slight extent by oils. It is also affected by the oxygen of the air, especially in light, becoming brittle, resinous, and acid; it combines with sulphur and, like caoutchouc, can be vulcanized.

Gutta-Percha was known in Europe long before its peculiar character and uses were discovered. It was from time to time brought home by voyagers, in the form of drinking bowls, which excited curiosity on account of the material of which they were made. Some thought it a species of India-rubber, others asserted it to be a kind of wood. Dr. William Montgomerie of the Indian Medical Service introduced it into England in 1843. Since that time the importation of it to Europe and America has reached large proportions. It is employed for a great variety of purposes, especially for insulating electric wires, being invaluable for submarine telegraph cables because, as a natural insulator of electricity, it is not affected by water, is very pliant, and forms a uniform and close-fitting coating to the wires. It is much prized for making certain kinds of surgical instruments, and in sheets for surgical dressing, and is used for making water-pipes and tubes of various kinds, hose, machine-belting, soles for shoes, golf-balls, overshoes, buckets, picture-frames, and many other articles in general use.

GUTTA ROSEA, *gŭt'ta rō'zē-a:* a kind of cutaneous eruption on the face, popularly called 'brandy blossoms,' from its frequent occurrence in dissipated persons advanced in life. It is very difficult of cure, and to be treated chiefly by a careful regimen.

GUTTÉ, *gŭt-ā* or GUTTY, *gŭt'ĭ* [Lat. *gutta*, a drop]: in heraldry applied to a field, or any particular charge on the field, covered with drops. When the drops are red, they represent drops of blood, and the bearing is said to be *gutté de sang:* in this case, some great suffering or labor, such as fighting for the recovery of the Holy Land, is indicated. When they are blue, they represent tears, and the bearing is said to be *gutté de larmes.* When white, they are called drops of water, and the bearing is described as *gutté de l'eau;* but Nisbet is of opinion that tears are intended in this case also, and that repentance or penitence is signified by both.

GUTTER, n. *gŭt tėr* [F. *gouttière*, a channel or gutter —from *goutte*, a drop—from L. *gutta*, a drop: Low Ger. *guddern*, to gush out]: a channel or hollow for conveying water; any hollow piece of wood or metal for conveying waste water: V. to form into small hollows or channels. GUT'TERING, imp. GUT'TERED, pp. *-tėrd:* ADJ. cut into gutters or small hollows.

GUT'TER, in Architecture: open channel for conveying water from buildings, roads, etc. Gutters are necessary for preservation of such structures, and have been in use in all ages. The Greeks, who constructed their roofs with a simple span, used gutters at the eaves of their buildings, hollowed out of the stone which formed the cornice. These gutters discharged their contents on the ground at intervals through small Gargoyles (q.v.), usually in the shape of lions' heads. The Romans followed this example, and formed gutters also with tiles laid in cement.

In the middle ages, the eaves seem to have been left without gutters, until as the castles were frequently on dry rocky sites, it was found desirable to collect the rain-water and preserve it in cisterns. Stone or wooden eaves, gutters, and pipes were used for this purpose. In ecclesiastical architecture, when the construction became complicated, it was necessary to convey the water from the roofs with great care, to prevent damage to the building. It was collected at the eaves of the central roof, and by means of well-projected gargoyles, thrown along channels formed in the crest of the buttresses and so carried beyond the walls of the building, and thrown off through gargoyles in a number of small streams, which dispersed the water before it reached the ground. This acted well in calm weather, but during storms the water was blown back all over the building, which, in case of its being of a porous stone, softened and became liable to decay. This led to the use of lead pipes, which carried the water directly to the ground, and discharged it into open gutters. At first, the pipes were used for conveying the water from the main roof to the roof of the side-chapels, whence it was discharged by gargoyles. Pipes conveying the water to the base of the building were employed first in England, where they

seem to have come into use in the 14th c.; they were formed with great taste, and had ornamental cups or cisterns at top to receive the water from the mouth of the gargoyle. They were then with considerable foresight, made *square* in form, not circular, as they usually now are. The advantage of the square section is, that if the water in the pipe be frozen, there is room for the expanding ice to swell out by slightly changing the form of the spuare.—See SEWAGE.

GUTTIFERÆ, *gŭt-ĭf'ėr-ē*, or CLUSIACEÆ, *klū-sĭ-ā'sē-ē:* natural order of exogenous plants, consisting of trees and shrubs, natives of tropical countries, generally secreting an acrid yellow resinous juice. A few are epiphytes. The leaves are opposite, destitute of stipules, leathery, and entire. In botanical characters, this order is allied to *Hypericinœ*. It contains about 150 known species, the greater part S. American, though all tropical countries produce some. The resinous secretions of some are valuable, particularly of those trees which yield Gamboge (q.v.) and Tacamahaca (q.v.). See also CLUSIA. A few species afford valuable timber: see CALOPHYLLUM. —The flowers of some are very fragrant; those of *Mesua ferrea* are found in a dried state in every bazaar in India, and are used as perfume. The fruit of some is very highly esteemed; the Mangosteen (q.v.) has been described as the finest fruit in the world. The Mammee Apple (q.v.) is another of the most celebrated fruits of this order.

GUTTIFEROUS, a. *gŭt-tĭf'ėr-ŭs* [L. *gutta*, a drop; *fero*, I bear]: yielding gum or resinous substances.

GUTTULATE, a. *gŭt'tū-lāt* [L. *guttŭlă*, a little drop]: in *bot.*, in the form of small drops; composed of small round vesicles.

GUTTURAL, a. *gŭt'tėr-ăl* [F. *guttural*—from mid. L. *guttŭrālis*—from *guttur*, the throat]: formed in the throat; pertaining to the throat: N. a letter pronounced in the throat. GUT'TURALLY, ad. *-lī*.

GUTZKOW, *gôts'ko*, KARL FERDINAND: 1811, Mar. 17 —1878, Dec. 16; b. Berlin: author. He was educated at the Friedrichswerder Gymnasium; studied philosophy and theol. at the Univ. of Berlin; became leader of the Young Germany party 1830; started a newspaper 1831; went to Stuttgart to assist in editing Menzel's *Literaturblatt;* continued his studies in the universities of Jena, Heidelberg, and Munich; engaged in journalism in Frankfort; was imprisoned three months and had all his writings suppressed for the atheistic and socialistic views expressed in his novel *Wally, die Zweiflerin* 1835; and the same year elaborated his opinions in *Nero*, a dramatic work. To escape the surveillance of the Prussian govt., he went to Hamburg 1837, thence to various German cities, and 1870 made his permanent residence in Berlin. He was author of numerous com-

edies, tragedies, dramas, and novels, which attained wide popularity but exerted a baneful influence.

GUTZLAFF, *güts'lâf*, Karl Friedrich August: German missionary to China: 1803, July 8—1851, Aug. 9; b. Pyritz, in Pomerania. At an early age he was apprenticed to a belt-maker in Stettin. Here he composed a poem, in which he expressed his earnest wish to become a missionary to the heathen, and 1821 presented it to the king of Prussia. The king caused him to be placed in the missionary institution at Berlin. At the expiration of two years, he was removed to the Dutch missionary society at Rotterdam, and 1826, Aug., was sent to Sumatra. Being detained at Java, he fixed his residence at Batavia, where he applied himself to the study of Chinese. At the end of two years, having acquired considerable knowledge of the language, and familiarized himself with the habits of the Chinese residents in Batavia, he determined to give up his connection with the Dutch society, and devote himself to the conversion of the Chinese. He joined Tomlin, the English missionary, and, in the summer of 1828, accompanied him to Siam. They settled at Bankok, the capital, partly for the purpose of preaching the gospel, partly to render themselves thoroughly acquainted with the Siamese language, and to perfect themselves in Chinese. For the sake of his health, he now, by the advice of a Chinese friend, undertook a voyage to China; and from this time, Macao became his principal station, and here he formed an intimate friendship with Robert Morrison. In conjunction with Medhurst and two other friends, Gutzlaff began a new translation of the Bible into Chinese. With the assistance of Morrison, he founded a society for the diffusion of useful knowledge in China, published a Chinese monthly magazine and preached at Macao and elsewhere. Compare his *Journal of Three Voyages along the Coast of China in* 1831, 1832 *and* 1833, *with Notice of Siam, Corea, and the Loo-choo Islands.* After the death of the elder Morrison, Gutzlaff was appointed chief interpreter to the British supervisional govt. in China, with a salary of £800. In this capacity he attempted 1835, May, to penetrate into the interior of the province of Fo-kien, but without success. At the same time, the printing of Christian books in the Chinese language and even the distribution of Christian writings among the inhabitants of Canton, were prohibited. Thus restricted in his missionary career, Gutzlaff joined the British during the war with the Chinese and his thorough acquaintance with the Chinese, rendered his services of great value. He likewise contributed to bring about the peace in 1842. Finally, in 1844, he founded a Chinese society, for the purpose of diffusing the gospel, by means of native Christians, in the interior of the country: this had such success that during the first four years as many as 48 Chinese were sent by it as Christian

workers among their own people. To promote the objects of the mission, he returned to Europe 1849, and visited England, Germany, and other countries. He returned to China, landing at Hong Kong 1851, Jan., but died there in the same year. Gutzlaff published various works in different languages, some of which are extremely valuable; the principal are *Geschichte des Chines. Reichs* (Stuttg. 1847), and *The Life of Taokuang* (Lond. 1851).

GUY, n. *gī* [Sp. *guia*, a guide; *guiar*, to guide: Scot. *gy*, a rope]: in a *ship*, a rope used to keep a heavy body steady while hoisting or lowering; a wire rope, chain, or rod to steady and prevent undulations in a suspension bridge.

GUY, n. *gī:* a grotesque effigy of *Guy* Fawkes; a person dressed in an odd or fantastic manner.

GUY, *gī*, THOMAS: founder of Guy's Hospital, Southwark, London: 1644–1724, Dec. 17; b. Horseleydown; son of a Southwark lighterman and coal-dealer. He began business as a bookseller with a stock of about £200, dealing extensively in the importation of English Bibles from Holland (those printed at home being executed very badly); and, on this being stopped, contracted with the Univ. of Oxford for the privilege of printing Bibles, which he continued many years. His principal gains, however, arose from the not very creditable practice of purchasing, during Queen Anne's wars, the prize tickets of seamen at a large discount; and subsequently investing them in South Sea Company's stock, by which means he amassed a fortune of nearly half a million sterling. In 1707, he built and furnished three wards of St. Thomas's Hospital. In building and endowing the hospital in Southwark which bears his name, he set apart £238,295,16*s*. He was also a liberal benefactor to the Stationer's Company, and built and endowed almshouses and a library at Tamworth. Besides making bequests to Christ's Hospital, and various other charities, he left £80,000 to be divided among those who could prove any degree of relationship to him. He was of mean appearance, with a melancholy expression of countenance, and during his whole lifetime had no other reputation than that of a selfish and avaricious man.

GUY'S HOS'PITAL. The first stone of the building was laid 1722, and the hospital admitted its first patient 1725, a few days after the death of its founder. The whole expense was £18,796,16*s*., great part of which Guy expended in his lifetime, and he bequeathed £219,499 to endow it. In 1829 Mr. Hunt bequeathed to the hospital £190,000, and additional bequests to the amount of £10,000 have since been received. There was at first room for about 400 patients; now 700 can be accommodated. The yearly average of patients is over 3,000; the out-patients relieved may amount to 50,000. The annual income is about £40,000. The usual number of

governors is 60, self-elective. Students enter the hospital for study, attending chemical practice, lectures, etc., and paying annual fees. A library and valuable museums, also a chapel, are attached to the hospital. Sir Astley Cooper, the eminent surgeon, is buried in the chapel.

GUYON (or GUION), *gī'on*, F. *ghe-yōng'*, JEANNE MARIE BOUVIERES DE LA MOTHE: leader of the mystic Quietists in the 17th c.. (see QUIETISM): 1648, Apr. 13—1717, June 9; b. Montargis, France. Her family removed to Paris 1663; and her beauty and brightness of mind drew many admirers. She had intended to enter the cloister, but at the earnest solicitation of her family married, at the age of 15, M. Guyon, 22 years her senior, son of a rich contractor of public works. Her married life was not very happy, and being left a widow at 25, and still retaining her early religious leanings, she transferred her three children to the care of guardians, settling on them almost all her property. Being thus entirely withdrawn from secular affairs, she attracted much notice by the high tone of spirituality which her conversation breathed, and was invited by M d'Arenthon, Bishop of Geneva, to settle in his diocese, where she formed the acquaintance of a Barnabite, Père Lacombe, then in much repute as a director of souls. The mystic doctrines which she learned from this ecclesiastic, and which involved such a degree of self-abnegation as to suppose that the truly Christian soul must become indifferent not only to life and death, but even to its own salvation or perdition, having come to the knowledge of the bishop, he withdrew his protection from Madam Guyon. In consequence she left Geneva, and accompanied by Père Lacombe, went to various cities of Italy and France, and eventually to Paris, where they drew about them a number of followers. The reputed extravagances of Madam Guyon, led to her being shut up by a royal order in the convent of the Visitation, from which, however, she was set free, at the instance of Madame de Maintenon, and through this lady obtained entrance into the highest circles of Paris and Versailles. It was now that she formed the acquaintance of Fénelon, who was completely won by her evidently sincere piety, and captivated by the earnestness and lofty spirituality of her views. He failed to see the evil consequences which they involved; and the confiding zeal with which he defended her not only against the misrepresentations with which she was assailed, but even against the too well founded imputations which her principles had drawn upon her, was the cause of his unhappy rupture with Bossuet (see FÉNELON). Madame Guyon having submitted her writings to Bossuet and other members of a royal commission, subscribed 34 articles which were drawn up by them, and promised to abstain from all further speculation on these subjects. But she failed

to keep her promise, and not only drew again upon herself the hostility of the court, but also became the object of much scandal on account of her intimacy with Père Lacombe. That the latter imputation was a calumny, it is impossible to doubt; but Madame Guyon was again put under arrest, and imprisoned first at Vincennes and Vaugirard, and ultimately in the Bastile. She was liberated 1702, and henceforth lived in comparative privacy till her death, which took place at Blois 1717. She is the author of several works, the chief of which are *Torrents Spirituels, Moyen Court de Faire Oraison,* and *Le Cantique des Cantiques interpreté selon le sens mystique,* together with an Autobiography and Letters, as also some spiritual poetry.

GUYON, *gī'on,* Richard Debaufre: 1813–56; b. Walcott, near Bath, England: general in the Hungarian army 1848–9. After having fought against Dom Miguel in Portugal, Guyon entered the Austrian service in 1832; was attached as aide-de-camp to Baron Splényi, whose daughter he married 1838. From that time till the outbreak of the revolution Guyon led the life of a country gentleman on his estates near Comorn, but was among the first and most prominent in the struggle for independence. During the retreat of Görgei's army, Guyon carried the mountain pass of Branyiszko, and by that daring feat re-established communication with the government at Debreczin, as also with the several other Hungarian army corps. When, 1849, Apr., the garrison of the besieged fortress Comorn was to be apprized of the victorious approach of the national army, Guyon, with a detachment of hussars, cut his way through the enemy's lines, and announced the approaching relief. The bloody affair of Szöreg allowed Dembinski, protected by the self-sacrificing ten battalions of Guyon, to retire to Temesvár, where the last battle of the Hungarians was fought and lost Aug. 9. Guyon escaped to Turkey, and entered the service of the sultan, without being compelled to turn Mohammedan. Under the name of Kourshid Pasha, he, as a gen. of division, was gov. of Damascus, and at the beginning of the Crimean war, did much to organize the army of Kars. He died at Constantinople. Indomitable courage, and incessant care for the comfort of the troops under his command, were chief features in Guyon's character.

GUYOT, *ge-ō',* Arnold Henry, ph.d., ll.d.: 1807, Sep. 28—1884, Feb. 8; b. Neuchatel, Switzerland: geographer. He was educated at Chaux-de-Fonds, Neuchatel, Carlsruhe, the Stuttgart Gymnasium, the Univ. of Berlin, where he graduated 1835, and in Paris 1835–39. His early intention was to prepare himself for the ministry, but he included philosophy and natural science in his studies, and through the friendship of Agassiz (q.v.) and Humboldt (q.v.) was led to a special investigation of geographical science. In 1835 he published a thesis

on *The Natural Classification of Lakes*, 1838 reported the results of a six-weeks' examination of Swiss glaciers to the French Geographical Soc., and 1839 became colleague of Agassiz as prof. of history and physical geography in the Neuchatel Acad. He remained there till suspension of the acad. by the revolutionary council 1848, and in the meantime discovered the laminated character of glacier ice, determined the cause of glacier movement, investigated the transportation of Alpine bowlders around the central Alps, and made other contributions to physical geography. In 1848 he removed to the United States, delivered a course of lectures in the Lowell Institute, Boston, and was employed by the Mass. Board of Education as a lecturer on physical geography for six years. In 1854 he was appointed prof. of geology and physical geography in the College of New Jersey, and held the office till his death. Besides his labors there he was for several years lecturer on physical geography in the N. J. State Normal School, and on the connection of revealed religion and physical and ethnological science in the Princeton Theol. Seminary, and delivered special lectures in the Union Theol. Seminary and Columbia College. He organized a system of meteorological observations for the Smithsonian Institution; was an original member of the National Acad. of Sciences, and honorary or corresponding member of the leading scientific societies of the world; received the medal of progress at the Vienna exhibition for his geographical works 1873, and the gold medal at Paris 1878. He published a series of school geographies (1866–75), and a set of school wall-maps; was (with Pres. Barnard) editor of *Johnson's New Universal Cyclopœdia* (1874–77); contributed numerous papers to the *American Journal of Science;* and shortly before his death completed *Creation; or, The Harmony between the Mosaic Cosmogony and the Facts of Science.* Among his works are, *The Earth and Man,* and *Man Primeval.*

GUZEL'-HISSAR. See AIDIN.

GUZERAT, *gŭz-ė-rât':* or GUJARÁT, *gôj-ėr-ât':* geographical divisions of India, n. lat. 20°—24°45′, and e. long. 69°—74° 20′; about 50,514 sq. m. Pop. about 5,500,000. Its most important section, perhaps, is the peninsula of Kattywar, which projects into the Arabian Sea between the Gulf of Cutch on the n.w. and the Gulf of Cambay on the s.e. Of the mainland a considerable portion is shut out from the sea by the British districts of Broach and Surat, so that the peninsula comprises nearly the whole of the coast-line and most of the available harbors. With regard, however, to internal communications, the mainland has the advantage of the peninsula, being traversed by the Nerbudda and the Tapti, beside streams of less magnitude. To the s. of the last-mentioned river Guzerat presents the n. extremity of the Western Ghauts. The products are rice, wheat,

barley, sugar, tobacco, castor oil, maize, opium, cotton, and fruits. Within the limits of Guzerat (also spelled *Gujarat* or *Gujerat*) lie the Guicowar's territory, and the numerous petty states of Kattywar, Mahi Kanta, and Rewa Kanta. The name Guzerat often includes also the British administrative division under the gov. of Bombay, which comprises the districts of Surat, Broach, Kaira, Punch Mehals, and Ahmedabad.

GUZERATI, n. *gô-zêr-â'tī*, or GOOZERA'TEE, n. *-â'tē* [native word]: native of Guzerat in India; the language spoken in that region. It was probably at first a Turanian language or dialect, but is now completely transformed by the introduction into it of a great multitude of words derived from Sanskrit.

GUZZLE, v. *gŭz'zl* [Swiss, *gutzeln*, to shake liquids in a flask: It. *gossare*, to guzzle—from *gozzo*, the throat: OF. *gouziller*, to gulp up, to swallow down]: to drink much and greedily; to drink often. GUZZLING, imp. *gŭz'lĭng*. GUZZLED, pp. *gŭz'zld*. GUZZLER, n. *gŭz'lėr*, an immoderate drinker.

GWALIOR, *gwâ'lē-awr:* hereditary dominions of the Mahratta chief Sindia (q.v.). It comprises several detached districts, about 28,000 sq. m. in the n.w. of India, e. long. 74° 45′—79° 21′. Lying partly in the basin of the Jumna and partly in that of the Nerbudda, it divides its drainage between the Bay of Bengal and the Arabian Sea. Though Gwalior is a Mahratta principality, in fact, the principal fragment of the great empire of the Peishwa, yet only s. of the Nerbudda do the Mahrattas form any considerable proportion of the people. Under such circumstances, therefore the dominant race can maintain its supremacy by force alone. Since 1803, the country has been under British protection, though the existing relations of the two parties date only from 1844. In 1843, the death of the sovereign, producing universal anarchy, led to the forcible interposition of the British govt.; and by the treaty of 1844, Jan., in addition to a large contingent under British authority, the native govt. was permitted to have 9,000 troops of its own. During the troubles of 1857, the new Maharajah, not more than 22 years old, remained faithful to the English, notwithstanding the almost entire defection of both divisions of the military force. Pop. (1901) 2,933,001.

GWA'LIOR: capital of the state of Gwalior in central India; near the n.e. extremity of its straggling territory. Its nucleus is an isolated rock about 340 ft. in height, perpendicular, either naturally or artificially, on all sides; and as it measures 1½ m. by 300 yards, it can accommodate a garrison of 15,000 men. It is thus virtually impregnable against any native force. The spot is understood to have been occupied as a stronghold for more than a thousand years, and the summit has been provided, from time to time, with several spacious tanks.

Along the e. base of this eminence lies the town of Gwalior, containing little worthy of notice but a beautiful mausoleum of white sandstone: and to the s.w. there extends for several miles the Lashkar, or camp of the Maharajah's own army, while n.e. is the Moorar, or cantonment of the protecting contingent. During the troubles of 1857–8, the place attained unenviable notoriety as a centre of rebellion, having, notwithstanding the fidelity of the Maharajah himself, been, for more than a year, in the power of the insurgents. Pop. abt. 30,000.

GWINNETT, *gwĭn-nĕt'*, Button: abt. 1732–1777, May 27; b. England: signer of the Declaration of Independence. He was educated for a mercantile career, established himself as a trader in Savannah 1765, and engaged in agriculture on St. Catharine's Island, Ga., 1770. In 1775 he was active in public affairs; 1776 was a representative in congress, signed the Declaration of Independence, and was elected representative for the following term; 1777 became a member of the Ga. state govt. and president of the provincial council, and died from a wound received in a duel with Gen. McIntosh.

GWYNIAD, *gwĭn'ĭ-ad* or *gwĭn'yad* (*Coregonus Pennanti*): one of the British species of *Coregonus* (q.v.) which, from their form, the large size of their scales, and their silvery appearance, are sometimes called *Freshwater Herring*, and are vulgarly identified with the herring. The general similarity is in this case very great. The gwyniad, full grown, is 10 or 12 inches in length; the first dorsal fin is high; the snout is a little produced; the mouth is small, the jaws without teeth, a few minute teeth on the tongue only. It is found in some larger lakes of N. Wales and Cumberland. Gwyniad is a Welsh name, and means 'shining.' At Ullswater, the fish is called *Schelly*. It occurs in that lake in great shoals, so that many hundreds are sometimes taken at a single draught of the net. It is rather an insipid fish, and cannot be kept long after being taken out of the water unless salted, which it often is by the poor. The Freshwater Herring of Loch Lomond is not the gwyniad, but the powan. Many of the species of this genus, however, very nearly resemble each other, and are not easily distinguished by mere description. It is curious that a fish in British Columbia is called by the natives *'quinnat*, which also means 'shining.'

GWYNN, *gwĭn* (or Gwinn), Eleanor, or Nell: about 1650–90; b. London: mistress of King Charles II. She was born in poverty and reared in vice; became an orange peddler, a tap-room dancer and singer, and the mistress of several actors; went on the stage when 16 years old, and attained popularity in pieces where dancing and singing were provided; became mistress of Lord Buckhurst when 17 years old; and was surrendered by him to the king two years afterward. Charles was exceed-

ingly attached to her, provided her an independent establishment, appointed her a lady of the queen's privy chamber, and erected Chelsea Hospital for disabled soldiers at her request. She bore him two sons, was liberal to actors and poets, was reputed a supporter of the Protestant cause at court, was the subject of the king's dying words, and at her death Dr. Tenison—afterward abp. of Canterbury—preached the funeral sermon.

GY'GES, *jī'jēz:* founder of the third (or Mermnad) dynasty of Lydian kings: reigned about B.C. 687–654. Nyssia, wife of Candaules, King of Lydia, having been grievously affronted by her husband in presence of Gyges, ordered the latter, who was in high favor with his sovereign, either to slay Candaules or to prepare for his own fate. (Compare history of Rosamund, wife of Alboin, King of the Lombards; Gibbon, V. 339, Murray's ed.) Gyges accordingly put his master to death, married Nyssia, and assumed the supreme power. The Lydians, however, refused to acknowledge his authority, until the oracle of Delphi declared in his favor. In return for this service, he made immense presents to the sacred shrine. He is said to have amassed enormous wealth, so as to give origin to the proverb, 'the riches of Gyges.' The successors of Gyges were Ardys, Sadyattes, Alyattes, and Crœsus, who was defeated by Cyrus the Great B.C. 546 (or 548). The Lydian empire was thus overthrown. Plato has a fable, in which Gyges is represented as a shepherd of Candaules; but having miraculously obtained possession of a golden ring of great virtue, he was enabled by means of it to make himself invisible when he chose, and thus took occasion to murder his sovereign, and usurp the supreme power. The ring of Gyges is frequently mentioned in the middle ages.

Gyges in anc. myth. was the name also of the hundred-handed giant, son of Cœlus and Terra, who with his brothers made war on the gods, and after his overthrow, was subjected to everlasting punishment in Tartarus.

GYLE-TUN, n. *jīl-tŭn:* a tun or vessel used by brewers.

GYMKHANA, *gĭm-kâ'na*, a term of Hindu origin, presumably derived from *gend-khana*, that is, ball-house, and associated by Anglo-Indian soldiers and civilians with 'gym' or gymnasium, whence its introduction into the English language. It is applied to a building or grounds arranged for athletic recreation, and signifies also the open air meetings for athletic and other mixed sporting events, including horse racing, which are the annual features of almost every military cantonment throughout India.

GYMNADENIA, n. *gĭm-na-dĕn'ĭ-a* [prefix *gymno;* Gr. *adēn*, a gland]: typical genus of *Gymnadenidæ*, family of orchids, tribe *Ophreæ*.

GYMNASIUM, n. *jĭm-nā′zĭ-ŭm* [L. *gymnăsĭŭm*; Gr. *gumnăsĭŏn*, in anc. times, a place where men wrestled naked—from Gr. *gumnos*, naked]: a school for gymnastics, or athletic exercises; in *Germany*, a grammar or high-school (see GYMNASIUM, below). GYMNAS′TICS, n. plu. *-năs′tĭks*, physical exercises tending to the improvement of health and strength, and muscular development (see below). GYM′NAST, n. *-năst*, one who excels in gymnastics. GYMNAS′TIC, a. *-năs′tĭk*, of or relating to gymnastics. GYMNAS′TICALLY, ad. *-lĭ*. GYMNA′SIARCH, n. *-nā′zĭ-ârk* [Gr. *archos*, chief]: in *anc. Greece*, the chief officer of a gymnasium. GYM′NIC, a. in *OE.*, practicing athletic or gymnastic exercises; pertaining to the exercises of the gymnasium.

GYMNA′SIUM: in ancient Greece, a public place or building where youths exercised themselves. In Athens alone there were seven resorts of this kind. Philosophers also gave instruction in these *gymnasia;* hence the transference of the name to public buildings erected for the mental disciplining and instruction of youth. The German G. corresponds roughly to the grammar and public schools of England, and the grammar schools and high endowed academies of the United States. All these classes of schools in Europe had their origin in the cathedral and monastery schools of the pre-reformation period. The widening circle of human knowledge in the 17th and 18th c. made itself felt in these educational seminaries, as in the universities. Their curriculum became gradually extended, and with the further increase and development of universities, their aims became still higher. In Germany, as in Britain and America, the classical tongues formed and continue to form the great instrument of mental discipline in schools of this higher class, though other subjects have been added from time to time. The subjects of instruction first added to the classical tongues were geography and history. The natural sciences and mathematics, the pursuit of which has formed a characteristic feature of this century, gradually found place in the school-room; and the study of the mother-tongue and of modern languages was admitted. For a time these subjects held a co-ordinate place with Latin and Greek. Departmental studies were taught with ardor, and educators were sanguine of the results which would follow from early initiation into the results and processes of the various sciences. These anticipations seem to have been not fully realized in Germany, and there has for some time been a movement toward the restoration of classical or humanistic studies to be the main instrument of education, while retaining other subjects as a subordinate portion of the curriculum. The idea, however, of the G. as specially a preparatory school for the university, and therefore not suited to all classes indiscriminately, has been more steadily kept in view in Germany than in the other countries, and the consequence has been the breaking up of

the middle school or G. into two—the G. proper, where those are taught who propose to enter the universities, or who desire a partial classical training; and 'real-schools,' where elementary science, foreign languages, and mathematics are the principal subjects of instruction. In this respect, the middle-school education of Germany has advantages over that of England, and perhaps still more over that in the United States. It is not to be supposed, however, that in the latter countries the great grammar schools are less efficient in their classical training; the contrary is probably the fact, so far as concerns the principal schools, such as Eton, Harrow, and Rugby, in England; and Phillips Acad., Phillips Exeter Acad., the Boston Latin School, and several others in the United States. But the methodized system of examinations, and the more rigorous methods of Germany, seem to turn out a larger *proportion* of well-instructed boys from each school, while the influence of central authority secures greater uniformity of processes and results throughout the country. The boys attend till they reach the age of 18, when, after a special examination (the abiturient or maturity examination), they are transferred to the university. The German gymnasia differ from English public schools and American high academies for the middle and higher classes, in being day-schools, and not the centre of great boarding establishments. In this respect they resemble the Scotch grammar and high-schools, and the high-schools in the common-school system of our own states.

GYMNA'STICS: physical exercises, not amounting in intricacy to games, by which particular muscle groups, either singly or in combination, are rendered more pliant or stronger, and especially exercises in which the attention of the performer is given to the form of the movement he is making: these exercises are arranged in a due progression, and the entire series becomes a system. Swimming, skating, boating, and games like golf (q.v.), cricket (q.v.), base-ball (q.v.), tennis (q.v.), etc., are among the most efficient gymnastic exercises; but in this article attention is confined to exercises whose primary and direct aim is muscular development and health.

Gymnastic games are so old as to be pre-historic: they are alluded to in the 2d and 23d books of the *Iliad*. Before the time of Hippocrates, gymnastic exercises had been adopted in Greece as part of the remedial course to counteract increasing luxury and indolence. The various exercises were speedily combined into a system, and gymnasia, where they should be carried out, were built first by the Lacedæmonians, and subsequently at Athens: see GYMNASIUM. The Romans adopted the system, and constructed gymnasia on a magnificent scale. Many of their buildings, having had extensive baths attached, were known as *Thermæ*. The exercises in the gymnasia consisted of running, leaping, dancing, wrestling, boxing, hurling, etc.; and in those days, when all men bore arms,

and when, in close combat, victory went generally with the strongest man, these games were doubtless of great value. In subsequent ages of knightly prowess, similar exercises were practiced, though less publicly; but with the introduction of gunpowder, and through its means, the gradual substitution of fighting at a distance—in which science and skill were the main requisites—for personal encounters where strength and muscle went far to carry the day, the attention paid to G. decreased, and finally vanished altogether. To make infantry soldiers perfect in the drilled movements of masses, cavalry good horsemen and fair swordsmen, and to have gunners who could take an accurate aim, became the utmost sought by the possessors of great armies; while the science of G., having gone out of repute for the military, was speedily neglected in merely civil life. It is only since the 19th century that the science has at all revived.

The revival commenced in Prussia, where, about 1806, gymnasia (in the strict sense) were opened by Basedow and Salzmann, that of the latter under the superintendence of the celebrated gymnastic pedagogue Guts Muths (q.v.); Jahn followed in the same line, and rendered the science so popular that it speedily attracted the attention of the youth throughout the kingdom, and to the training thus obtained must be attributed, in no small degree, the vigor which succeeded in driving out the French army of the first empire. Sweden soon imitated Prussia, and from that time G. have been prominent in the Scandinavian course of education. In Prussia the turning places began to be the scenes of political gatherings, too liberal in tendency to please its semi-military government; and 1818 they were all closed. The troops were, however, continued in gymnastic exercises, and showed so clearly the advantages of the training that, about 1844, Louis Philippe adopted and improved the system in the French army. From that time, gymnasia have been constructed for almost all continental armies, and, with more or less success, for the civil population. England moved in the matter only a few years ago by establishing instruction in G. at Aldershot and other camps; in private life, however, there have long been many excellent gymnasia. In the U. S. Military Acad. at West Point, the training in G. is admirably thorough. Many colleges and universities in this country have costly buildings and apparatus, and systematic training in gymnastics.

The two most important systems of gymnastics are the Swedish and the German. The Swedish system is based on about 50 fundamental exercises that are chosen with great care to produce certain definite effects on the body. Lessons are arranged on a uniform plan called the 'Day's Order,' which includes 11 different groups of exercise in a specified order.

The German system, instead of being limited to a few exercises, includes a very wide range. Great variety is provided, including exercises without apparatus; with

light apparatus in the hands, as in club, bell, wand and other exercises of similar character; exercises on heavy or stationary apparatus, such as bars, rings, horse, ladders, etc.

Different instructors adopt various systems of instruction. The course in the French army is one of the best of the simpler systems. The equipment consists of a broad belt, to be strapped tightly round the waist above the hips as a support to the body. The implements most commonly required are an iron ball in a rope-sling, with a loop for the head to pass through; wrestling-handles, consisting of two wooden bars, each about 18 inches long, connected by stout cordage; a club; leaping bars, to be leaped over; and leaping-poles wherewith to leap. The system of instruction is divided into a number of 'courses' regularly graduated, beginning with elementary and special movements, with a view to render every part of the body supple, and to develop the several muscles and give complete command over all their motions (*elementary gymnastics*); and proceeding to exercises of leaping, suspension, standing and walking on beams, walking on stilts, climbing, swinging, vaulting, etc. (*applied gymnastics*).

The theory of the advantage derivable from G. is simple. Within certain limits, parts of the human frame increase in strength, aptitude, and size, in proportion to use. In G. this law is brought to bear successively on every part, and finally on the whole system in combined action. If the exertion be not carried so far as to induce excessive fatigue, all other parts of the body sympathize with the improving condition of that which is mainly exerted; the circulation, excited from time to time by the exercise, acquires fresh vigor, and blood being driven with unwonted force into all parts of the system, every function is carried on with increased activity; an improvement in the general health soon becomes manifest, and the mind—if simultaneously cultivated—increases in power and endurance.

Gymnastic exercises require to be practiced with many precautions, and always with moderation and due regard to the strength of the individual. The whole benefit may be counteracted by excess; the muscles may be overstrained, and ruptures and other serious accidents ensue. The danger of such evils from gymnastic exercises has perhaps been exaggerated: and it is to be remembered that hardihood can in no way be obtained without risk; for cricket, fencing, boating, and other manly sports, are attended with at least as much danger.

See Alexander, *Modern Gymnastic Exercises* (1890); Stebbins, *Delsarte System of Expression* (1892); Posse, *Special Kinesology of Educational Gymnastics* (1894); Ravenstein, *Volksturnbuch* (1894); Broesike, *Der Menschlich Körper, mit besonderer Berücksichtigung des Turnens* (1894); Nissen, *Rational Home Gymnastics for the Well and the Sick* (1898).

GYMNAXONY, n. *jĭm-năks'ŏ-nĭ* [Gr. *gumnos*, naked; *axon*, an axle-tree]: in *bot.*, a state in which the placenta protrudes through the ovary and alters its position.

GYMNE'MA. See Cow Plant.

GYMNETRUS, *jĭm-nē'trŭs:* genus of acanthopterous fishes of the Ribbon-fish (q.v.) family having the body much elongated, and at the same time attenuated and compressed, the dorsal fin extending the whole length of the back, the ventral fins consisting only of a single long ray, often dilated at the end; the mouth small. The fishes of this genus are inhabitants of great depths, and are rarely taken or thrown ashore. *G. remiceps* is a native of northern seas; *G. Hawkenii* has occurred on the coast of Britain; other species are tropical.

GYMNOBLASTIC, a. *jĭm-nō-blăs'tĭk* [Gr. *gumnos*, naked; *blastos*, a bud]: applied to the hydrozoa in which the nutritive and reproductive buds are not protected by horny receptacles.

GYMNOCARPOUS, a. *jĭm'nŏ-kâr'pŭs* [Gr. *gumnos*, naked; *karpŏs*, fruit]: in *bot.*, applied to certain lichens whose spores lie in widely open receptacles.

GYMNOCLADUS, *jĭm-no-klā'dŭs* or *jĭm-nŏk'la-dŭs:* genus of trees of nat. ord. *Leguminosæ*, sub-ord. *Cæsalpiniæ*.—*G. Canadensis* is found in Canada and over a great part of the United States, attaining a height of 50–60 ft., with branches remarkable for upright direction, and an exceedingly rough bark which comes off in slips. The leaves of young trees are very large, three ft. long, bipinnate. The flowers are white in short spikes. The pods are five inches long by two broad. The tree is called *Chicot* in Canada, and sometimes *Stump Tree*, from its dead appearance in winter, and the absence of conspicuous buds. It is also called the *Kentucky Coffee Tree*, because the seeds were formerly roasted and ground as coffee in Kentucky. The wood is used by cabinet-makers and carpenters. It has very little sap-wood. The pods, preserved like those of the tamarind, are said to be wholesome and slightly aperient.

GYMNODONTS, n. plu. *jĭm'nō-dŏnts* [Gr. *gumnos*, naked; *odon'tes*, teeth]: applied to a family of fishes in which the jaws are covered with a substance resembling ivory, arranged in small plates representing united teeth: see Diodon.

GYMNOGEN, n. *jĭm'nō-jĕn* [Gr. *gumnos*, naked; *gennăō*, I produce]: in the botanical system of Lindley, a plant with exogenous stem and perfectly naked seeds, i.e., seeds not inclosed in an ovary. He forms of them a separate class, of which *Coniferæ*, *Taxaceæ*, *Cycadaceæ*, and *Gnetaceæ* are the orders. They are remarkable for the large apparent perforations or disks in the vessels of the wood, but they have concentric zones, spiral ves-

sels, and a central pith, like other exogenous plants. Their great peculiarities, however, are the total absence of a pericarp, and that fertilization takes place directly through the foramen of the ovule, without the intervention of style or stigma.

GYMNOLÆMATA, n. plu. *jĭm'nō-lē'mă-tă* (Gr. *gumnos*, naked; *laimos*, the neck or throat]: an order of the polyzoa, having the mouth devoid of the valvular structure known as the epistome.

GYMNOPHIONA, n. plu. *jĭm'nŏf-ĭ-ō'nă* [Gr. *gumnos*, naked; *ophis*, a serpent, *ophĭos*, of a serpent]: the order of the amphibia comprising certain snake-like species.

GYMNOSOMATA, n. plu. *jĭm'nō-sŏm-ă-tă* [Gr. *gumnos*, naked; *sōmătă*, bodies]: order of pteropodous (q.v.) mollusks, destitute of shell, having a distinct head, and swimming by fins attached to the sides of the neck. They all are marine. The *Clio borealis* of the arctic seas (see CLIO) is the best known and most interesting example.

GYMNOSOPHIST, n. *jĭm-nŏs-ŏ-fĭst* [Gr. *gumnos*, naked; *sophos*, wise, *sophistes* a philosopher]: barefooted and slightly clad Hindu philosophers of a class who anciently lived solitarily in the woods, wore little or no clothing, and addicted themselves to mystical contemplation and the practice of rigorous asceticism. Strabo divides them into Brahmans and Samans, the former of whom adhered to the strictest principles of *caste*, while the latter admitted any one into their number regarding whose character and kindred they were satisfied.—GYMNOS'OPHY, n. *-ŏ-fĭ*, doctrines of the gymnosophists.

GYMNOSPERMOUS, a. *jĭm'nō-spėr'mŭs* [Gr. *gumnos*, naked; *sperma*, seed]: having naked seeds, or seeds not inclosed in a true ovary, as Conifers. GYMNOSPER'MÆ, n. plu. *-spėr'mē*, or GYM'NOSPERMS, n. plu. *-spėrmz*, plants differing from exogens in having naked ovules; plants having ovules developed without the usual integuments; see GYMNOGENS.

GYMNOSPORE, n. *jĭm'nō-spōr* [Gr. *gumnos*, naked; *spora* seed]: a naked spore. GYM'NOSPO'ROUS, a. *-spō'rŭs*, of or pertaining to plants having naked spores. GYM'NOSPO'RÆ, n. plu. *-spō'rē*, the class of plants having naked spores, including fungi and algæ.

GYMNOSTOMI, n. plu. *jĭm-nŏs'tŏ-mī* [Gr. *gumnos*, naked; *stoma*, a mouth]: mosses without a peristome, or naked-mouthed. GYMNOS'TOMOUS, a. *-tŏ-mŭs*, naked-mouthed; without a peristome.

GYMNOTUS, n. *jĭm-nō'tŭs* [Gr. *gumnos*, naked; *notos*, the back]: the electric eel of S. America.

GYMNOTUS, *jĭm-nō'tŭs:* genus of malacoptetrous fishes of which only one species is known, the celebrated *G. electricus*, or Electrical Eel. This genus gives its name to a family *Gymnotidiœ*, of which, however, no other known species has any electrical powers. The *Gym-*

notidiæ are mostly S. American, inhabiting the fresh waters of the tropical regions. They are eel-like in form, and like eels are destitute of ventral fins (apodal), but they are furnished with complete jaws and with ribs, and their fin-rays are jointed or branched. They have pectoral fins but no dorsal; the anal fin is largely developed, extending either to the point of the tail, as in the electrical eel, or leaving it free. The electric eel (q.v.) has the skin entirely soft and destitute of scales. It is very widely diffused over the warm parts of America, and is found both in streams and pools. It is capable of being tamed, and when familiar, will allow itself to be handled without giving a shock, but employs its electrical powers both to kill prey and to defend itself from assailants, most frequently, perhaps, alligators. All the *Gymnotidæ* are remarkable for the position of the anus, which is so very far forward as in the electrical eel to be before the gill-openings, while in some of the other fishes of this family it is even before the eyes. Some fishes of this family have an elongated snout. The electrical eel, however, has a rounder and more obtuse nose than the common eel.

GYNÆCEUM, *jĭn-ē'sē-ŭm:* in Greek and Roman antiquity, the part of the house reserved for the use or the employments of women; usually an apartment remote from the entrance and beyond the interior court: also a manufactory managed by women, in which the imperial family's clothing and furniture were made. In *botany*, the pistil.

GYNANDRIAN, a. *jĭn-ăn'drĭ-ăn* [Gr. *gŭnē*, a female; *andra*, a male]: in *bot.*, applied to those plants—the GYNAN'DRIA, *-drĭ-ă*—which have the stamens adhering to the pistil, as in orchids; also GYNAN'DROUS, a. *-drŭs.*

GYNANDROPHORE, n. *jĭn-ăn'drō-fōr* [Gr. *gŭnē*, a female; *andra*, a male; *phŏrĕō*, I bear]: in *bot.*, a column bearing stamens and pistils.

GYNANTHEROUS, a. *jĭn-ăn'thėr-ŭs* [Gr. *gŭnē*, a female; *anthēros*, flowery, blooming—from *anthos*, a flower]: an abnormal condition of the flower in which the stamens are converted into pistils.

GYNARCHY, n. *gĭn'âr-kĭ* [Gr. *gŭnē*, a woman; *archē*, government]: government by a woman. GYN'ECOC'RACY, n. *ĕ-kŏk'ră-sĭ*, or GYN'EOC'RACY, n. *ĕ-ŏk'ră-sĭ* [Gr. *kratos*, strength, authority]: female ascendancy or government; a government over which a woman may preside.

GYNECOLOGY, or GYNÆKOLOGY, or GYNÆCOLOGY, n. *jĭn'ē-kŏl-ŏ-jĭ* [Gr. *gŭnē*, a woman, *gunaikos*, of a woman; *logos*, discourse]: the science which investigates the nature of the generative powers of women, and their diseases.

GYNE'RIUM. See PAMPAS GRASS.

GYNIZUS, a. *jĭn-ī'zŭs* [Gr. *gŭnē*, a woman]: in *bot.*, applied to the position of the stigma on the column of orchids.

GYNOBASE, n. *jĭn'ō-bās* [Gr. *gŭnē*, a woman; *băsĭs* a base]: a fleshy substance in the centre of a flower, to the base of which the carpels are attached. GYN'OBA'SIC, a. *-bā'zĭk*, having a gynobase: applied to a style springing from between the carpels as in *Labĭātæ*.

GYNŒCIUM, n. *jĭn-ē'zhĭ-ŭm* [Gr. *gŭnē*, a woman; *oikos*, a house]: female organs of the flower; the pistils. GYNOE'CIA, n. plu. *-ē'sĭ-ă*, female organs.

GYNOPHORE, n. *jĭn'ō-fōr* [Gr. *gŭnē*, a female; *phorĕō*, I bear]: in *bot.*, a stalk supporting the ovary; in *zool.*, the generative buds or gonophores of hydrozoa containing ova alone, and differing in form from those which contain spermatozoa.

GYNOSTEGIUM, n. *jĭn'ō-stē'jĭ-ŭm* [Gr. *gŭnē*, a female, a pistil; *stegō*, I cover]: the staminal crown of *Asclēpĭăs*, a genus of plants.

GYNOSTEMIUM, n. *jĭn'ō-stē'mĭ-ŭm* [Gr. *gŭnē*, a female, a pistil; *stēmōn*, a thread, a stamen]: a column in orchids bearing the organs of reproduction; the united stamens and pistils of orchids.

GYP, n. *jĭp* [Gr. *gups*, a vulture: Scot. *gype*, greedy, voracious]: in *familiar language* at Cambridge University, a man-servant of undergraduates and others. *Note.*—So named from their supposed dishonesty and rapacity; also said to be a corruption of *gypsy-Joe:* at Oxford similar servants are called *scouts*.

GYPAËTOS. See LÄMMERGEIER.

GYP'SIES. See GYPSY.

GYPSUM, n. *jĭp'sŭm* [L. *gypsum;* Gr. *gupsos*, white lime]: a soft chalky stone which, calcined and burnt, and reduced to powder, is called *plaster-of-Paris;* sulphate of lime or calcic sulphate. GYP'SEOUS, a. *-sē-ŭs*, or GYPSINE, or GYPSIN, a. *jĭp'sĭn*, consisting of or resembling gypsum. GYPSIF'EROUS, a. *-sĭf'ĕr-ŭs* [L. *fero*, I bear]: containing gypsum.

GYP'SUM: mineral consisting essentially of sulphate of lime and water, the proportions being lime, 32·56; sulphuric acid 46·51; water, 20·93. It is very widely diffused, occurs in great abundance in many parts of the world, and is found in rocks and strata geologically very different, as in transition rocks, in secondary and in tertiary formations. It occurs often in nests or kidney-shaped masses in clay or marl. It is found above chalk in many places, and large quantities are quarried in parts of England from the red marl immediately above the great bed of rock-salt. It occurs in beds sometimes many feet thick. It is transparent or opaque, white, yellowish-white or gray, or even yellow, red, brown, or black, according to its purity of chemical composition or the quantity and nature of impurities present. It is also compact, fibrous, foliated, or earthy: sometimes crystallized in six-sided prisms or in lenses. Twin crystals are frequent. It is easily broken, scratched, and

cut. Before the blow-pipe, it becomes opaque, if not already so, and fuses into a white enamel. The water which it contains is driven off by a heat of about 272° F., and it is then easily reduced to powder, in which state it is well known as *Plaster of Paris*. Unburned gypsum is tough, and not easily reduced to powder. Gypsum is soluble in cold water, to the extent of about one part in 461, and is a frequent ingredient in the water of springs; it is scarcely more soluble in boiling water or in acids. Gypsum as a fertilizer, sometimes proves very useful, but its action is uncertain, and its value for any given locality can be determined only by experiment. On some fields it gives marked and immediate results; while on others, close by and apparently in the same condition, it produces no appreciable effect. Gypsum supplies lime and sulphuric acid to plants; but a large proportion of soils contain these elements in sufficient quantities for most of the ordinary crops. Its principal value is probably in its power of absorbing and retaining ammonia, forming a salt not volatile but readily soluble, which, by the action of rain, is carried to the roots of plants. It is sometimes very efficient when applied to worn soils, but if used without manure, will be a permanent injury to the land. On such soils it acts principally as a stimulant, setting free the small quantities of potash and phosphoric acid which they contain and leaving them utterly exhausted. When sprinkled over the manure heap, gypsum prevents the escape of ammonia, and also acts as a disinfectant. It should be scattered in stables in warm weather; and it is especially valuable for sowing on stable manure which has been spread on grass land. It is sometimes beneficial to grass when used alone. Gypsum usually gives better results in wet seasons than in dry, and frequently proves more efficient in partially shaded situations than in those which are exposed fully to the sun. It is often used, either alone or mixed with ashes, as a fertilizer in the hills for potatoes and corn. It is also sprinkled upon the plants at the second hoeing. On some soils gypsum is valuable for clover and for grain. It may be sown before or after the seed has been harrowed into the ground. It is often used on the young plants of the cucumber and squash, serving the double purpose of a fertilizer and a protection against destructive insects. It should be sprinkled over the leaves when they are wet with dew. The quantity to be applied to grass land, pastures, and grain fields, is from 100 to 200 lbs. per acre, scattered broadcast. If used in hills or drills, it should be mixed with earth, or else kept from contact with the seed.—Gypsum deprived of its water by burning, and reduced to powder, forms a paste which almost immediately *sets*, or becomes firm and solid, when mixed with its own bulk of water; hence the great use of *Plaster of Paris* for making casts and cornices. But of the gypsum is burned at too great

a heat, it refuses to set, and the powder of the mineral called *Anhydrite*, which is an anhydrous sulphate of lime, has not the property of setting.—One of the finest varieties of uncrystallized and untransparent gypsum is alabaster (q.v.).—*Satin Spar* is a beautiful fibrous variety of gypsum, exhibiting a fine play of light, and employed for necklaces, inlaid work, and other ornamental purposes, but having the disadvantage of being easily scratched.

GYPSY, n. spelled also GIPSY and GYPSEY, n. *jĭp'sĭ* [a corruption of *Egyptian*]: wandering race of people found in almost every European country and in North America, supposed to have come from central Asia, and in some cases through Egypt: name of slight reproach to a young woman. GYP'SIES, n. plu. *-sĭz*. GYPSY, a. pertaining to or resembling the gypsies. GYPSYING, imp. behaving or living like a gypsy. GYPSYISM, n. arts or practices of gypsies; cheating. GYPSOLOGY, n. knowledge or investigation concerning the gypsies. GYPSOLOGIST, n. one who studies or has knowledge concerning the gypsies.

GYPSIES [Fr. *Bohemiens;* Germ. *Zigeuner;* Dutch *Heathens;* Dan. and Swed. *Tatars;* Ital. *Zingani;* Span. *Gitanos, Zincali;* Hung. *Czijányok. Pharaonepek;* Pers. *Sisech;* Hindu, *Karachee;* Arab. *Harami;* Gyps. *Rom* (man), *Sinte* (from Ind.), *Calo* (black): nicknamed in Fr. *Cagoux, Geux;* Germ. *Zieh-Gauner*, etc.]: mysterious vagabond race scattered over the whole of Europe and parts of Asia and Africa, and seen sometimes in small numbers in America. Whence they originally came, and what were the motives which drove them from their native soil are questions which, after having passed through a long stage of helplessly absurd speculation, have of late years been dealt with by competent investigators, both linguists and historians, but are still only partially solved. So much only seems now established, that India, cradle of many nations, was the source from which they also sprang. Whether, however, they are the Tshandalas of which the laws of Menou speak, or the kinsmen of the Bazeegars or Nuts of Calcutta; whether they belong to the Tshingani, a band of robbers near the mouth of the Indus, or are the descendants of those Lurs—identical, according to Persian and Arabic authorities, with the Zuts or Djatts of n. India—whom Firdusi mentions as having been called into Persia by Bahram Gur to the number of 10,000, about A.D. 420, that they might act as musicians to the poor—cannot be affirmed with certainty, though there can be no doubt that theirs must have been at all times one of the poorest and most obscure tribes of India. The first considerable body left Asia for Europe before the 12th c., perhaps in consequence of disastrous encounters with the Arabian conquerors; and Tamerlane was unquestionably the cause of still more numerous emigrations in the 14th c. The first notice of them in European literature is

embodied in a free paraphrase, in German, of the Book of Genesis, written by an Austrian monk about 1122. They are there described as 'Ishmaelites * and braziers, who go peddling through the wide world, having neither house nor home, cheating the people with their tricks, and deceiving mankind, but not openly.' Two hundred years later we find them settled in Hungary (under Betus II.), at Cyprus, and in Wallachia. In 1417, they travelled in great hordes into Moldavia and many parts of Germany. In 1418, five months after the Council of Constance, they appeared, about 1,000 strong, before Zürich, commanded by a Duke Michael 'of Little Egypt,' accompanied by several dukes and knights, and carrying with them a good supply of money, sporting-dogs, and other 'marks of nobility.' From Switzerland they descended into Italy, and 1422 they showed themselves at Bologna and Forli. Another band, numbering, this time, according to the old Swiss historian, Stumpf, 14,000, arrived in the same year at Basel. 1427, Aug. 17, a band of them, coming from Bohemia, made their appearance before Paris, which, however, they were not allowed to enter, but were lodged at La Chapelle Saint Denis. Other hordes succeeded these in the following years, spreading in rapid succession over parts of Germany, over Spain, England, Russia, Scandinavia, and, indeed, over the remotest parts of Europe. The account which they most frequently gave of themselves was, that they originally came from 'Little Egypt;' that the king of Hungary had compelled about 4,000 of them to be baptized, had slain the remainder, and had condemned the baptized to seven years' wandering. Another version of their story was, that the Saracens had gone to war with them in Egypt, had subdued them, and forced them to renounce Christianity; that, after some years, they had been reconquered by the Christians, and that the pope, Martin V., had laid upon them, as a penance for their renunciation of the true faith, a life of wandering for the space of seven years, during which they were not to sleep in a bed. At the end of this period, they would be sent to a fine and fertile land. Yet another account was, that they were commanded by God to roam through the world for that period, in expiation of their want of hospitality toward Joseph and the Virgin Mary—a notion which has, curiously, been partially revived in our own day by Roberts, with this difference only, that he attempts to prove them, from the prophecies of Isaiah, Jeremiah, and Ezekiel, to be the descendants of the ancient Egyptians, and their wanderings the predicted punishment of the various iniquities of their forefathers.

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*Ishmaelites—a notion perpetuated in the designation *Geschmeilim* of the Danish thieves' jargon, and the German *Rothwälsch* (Dorph, 44 and 45; Grolman, 65)—a term which has hitherto puzzled all investigators, Pott himself not excepted (cf. p. 28; Heister, p. 8), but which is nothing but a corruption of the Hebrew *Jishmăelim*—Ishmaelites.

At first they were well received. The romance with which they surrounded themselves, their pretended state of penitence, above all, the pomp and wealth that they displayed, were sufficient to secure the good-will of the countries through which they passed—so much so, that letters of safe-conduct were given them by Emperor Sigismund, the genuineness of which there is no reason to doubt. Soon, however, the tide began to turn. Their resources gone, they were everywhere treated with contumely, and despised chiefly for the degrading arts of chiromancy, magic, and thieving, to which they again resorted for their support, like their earlier brethren, described by the monk. And with the reckless brutality characteristic of the middle ages, edict after edict was hurled against these 'diviners and wicked heathens.' The governments of Europe vied with each other in banishing, outlawing, and slaying them whenever and wherever found, and in most severely punishing those that dared to shelter them, chiefly 'because of their traffic with the devil.' These edicts remained in force in many countries down to the 18th c.; and Frederick the Great, 1748, renewed the law that every Gypsy beyond the age of 18, found in his states, should be hanged forthwith. In England, the most barbarous decrees against them were issued by Henry VIII. 1531 and Elizabeth 1563. In Scotland, where, under James V., a certain Johnny Faa had been officially recognized by the crown as Lord and Count of Little Egypt, some of the severest edicts date from 1570, 1603, and 1609; and in 1624, Helen Faa, a descendant of Johnny, together with 15 other women of the seed-royal, were condemned to be drowned. Toward the latter half of the last century, however, more humane measures were adopted toward them, with a view to the improvement of their social and moral state. Maria Theresa, 1768, and 73, issued ordinances for the education of their children, and their gradual settlement as cultivators of the soil, chiefly in Hungary and Transylvania, where they swarmed in large numbers; special streets were built for them at the ends of the villages, and the name of Uj-Magyar, Uj-Parasztok (New Peasants), was officially bestowed upon them. Joseph II. renewed these edicts 1782, with certain modifications. Various other methods of gradually amalgamating them with the general population were tried elsewhere (a society was formed for that purpose at Southampton, England, by the Rev. Mr. Crabb 1832), but with comparatively little effect. They have continued—with few exceptions—their peculiar nomad life, with all its questionable resources and practices, its joys and its sorrows, unchanged, up to this day; and even gypsy children, brought up far from ther tribe, in the midst of Christian families have yielded to some mysterious and uncontrollable impulse, and have run away from their civilized home as soon as a favorable opportunity offered.

The opinions concerning them, held by the learned since the 15th c. have been very various. They have been then by turns set down as Egyptians, Nubians, Tartars, Cilicians, Mesopotamians, Assyrians, Ethiopians, Moors, Armenians, Manichæans, Banditti, and German Jews. More recently, on account of the name of Zingari or Zingani—probably a corruption from their own name Sinte (from Ind.), by which they are known in many countries of Europe, they were brought in connection with the Sigynnai, a people of Median origin, settled on the Danube, mentioned by Herodotus; with the Sigynni of Strabo, in the Caucasus; with the Usbecks, and a host of other tribes known and unknown. Again their name has been derived from one Zinganeus, who, 1517, when they had long been known as Zingani, fled with his followers to escape the vengeance of Selim. The now recognized theory of their Indian origin, proved incontestably by their language, was first positively advanced by Rüdiger 1782; and in his track followed, with more or less success—collecting, comparing, or arranging new and old linguistic materials—Grellmann, Alter, Seetzen, Pottinger, Hoyland, Puchmayer, Ouseley, Danilowicz, Bischoff, Domeny de Rienzi, Graffunder, Richardson, Bishop Heber, Pott (whose wonderfully exhaustive work on this subject made him the *facile princeps* of gypsologists), and more recently Paspati, Miklosich, Borrow, Leland, Smart and Crofton. Bataillard wrote on the history of the gypsy without discussing specially their language.

This their language, then—a daughter of the old Sanskrit—has, besides giving the only real clue to their origin, also shed some rays over the dark period between their first emigration and their appearance in Europe. Originally the distinct mode of speech of a single and special border tribe of n. India, it has, during the many wanderings of the race, appropriated words from every country through which they passed; while on the other hand, it lost many of its own words, and still more of its own inherent power and elegance, and much also of its resemblance to its mother and sisters. These adopted foreign words, their respective number, and their more or less corrupted state, point plainly to the gypsies having passed first into Persia, to their having remained there for a considerable time, to their having then wended their way to some Greek country, perhaps Asia Minor (the designations for 7, 8, and 9 being still Greek), and to their descent thence into Hungary, Cyprus, etc.

But their language also (Romany Tschib), though split into different dialects, has also remained almost the only tie which binds the widely-scattered nomad members together. Those of their branches who for centuries have had no intercourse with each other, would, though the strange elements in the other's speech would be incomprehensible to them, yet recog-

nize each other at once by certain words and formulas indelibly written in the memory of the whole race. The outward appearance of the gypsies, who have been pronounced by competent writers one of the handsomest races of humanity, varies in some degree according to the climate under which they are born and in which they roam. Their chief characteristics, however, remain everywhere the same; tawniness of skin; slightly projecting, but agreeably formed cheek-bones; long hair, of the color and lustre of coal; large black eyes, exquisitely shaped mouths, ruddy lips, teeth of dazzling whiteness, slenderness, and agility of limb, expressive features, and well-proportioned, often elegant build. Their women are, indeed, exquisitely beautiful when young, but they lose their good-looks at a very early period, partly through the squalor of their habits, and partly through their unsettled and precarious life. Like children they are fond of showy colors in dress, and do not disdain to adorn themselves with even dubious trinkets and fine garments in a forward state of decay; but they always arrange their clothes, however poor, with great taste. Superstition gave them credit for intercourse with demons. It has been usual for strangers to them to believe and allege all manner of evil as to their character; to say that they are cowardly, revengeful, and treacherous; that they allow themselves to be used as spies; are the associates of robbers and thieves; and that their women, chaste themselves, ply all sorts of questionable trades. But those who know them well affirm that their chief faults are vanity, cunning unscrupulously exercised for professional purposes, laziness, violent temper, and recklessness in their resentment, though they are swift to forgive. In their character good and evil are strangely mixed. They are irrepressibly light-hearted and gay, and singularly courteous; keen in their notions of honor, and full of tender family affection. They are free-handed to poor friends. Certain it is, however, that their ethical code differs essentially from that of other people (Gorgio), whom they despise for their childish credulity and brutal cruelty. They have proved themselves, on several occasions, bold and courageous as lions, but they prefer running away to fighting the battles of the foreigners, and it is also agreed on all hands, that they are passionately attached to their relations; that they are fatalists, and have a sort of fetichism or pantheism, though its peculiar form has never been revealed by them to any inquisitive tourist. At the same time they belong outwardly to the religion of every country which they happen to inhabit, and repeat the process of baptism as often as they can, with a view, as some have it, to the presents of godfathers and godmothers. They believe in a metempsychosis or transmigation of souls, and refrain for that reason from eating certain animals (eels, etc.), though, generally, they are anything but

choice in their food. They are dirty, lazy, and fond of drinking, and are great smokers. Their talent for music is remarkable in the extreme; their ears seize, and their instruments reproduce, after the first hearing, the most difficult and complicated pieces, even entire symphonies. Many famous artists (Kecskemecz, Bunks, etc.) have issued from their ranks; and their own melodies sounding over the wide Hungarian pushtas; the steppes of Russia or through the streets of Jassy, are not easily forgotten. Some of these melodies have indeed become the much valued property of other nations, or are embodied in some favorite operas. No less wonderful is the grace and charm of their wild dances. Altogether, the gypsies are one of the most gifted races, the lost geniuses, so to say, of humanity. The truth about them, their traditions, and religion, will, we fear, be ever kept a secret. The statement of George Borrow, who lived so long among them, that their entire catechism is summed up in the three precepts: 'Be true to your people—be faithful to your husbands—and never pay any debts except those owing to your own kindred,' must, we fear, be received with the same degree of caution which, we are sorry to say, has to be applied to many other statements about their manners and customs contained in his otherwise useful *Gypsies in Spain.* The incredibly absurd descriptions of the Jewish marriage-ceremonies about which we do not possess the fullest and most authoritative information, given there as a counterpart to those of the gypsies, show plainly how easily and abundantly Borrow's good-natured credulity must have been worked upon.

The increase in population, and the growth of culture all over Europe, are their chief antagonists. Their forests are cut down, their heaths inclosed, the houses are pushed right into their commons; and the easy and remunerative belief in their secret arts is waning more and more. It is doubtful, indeed, whether they will, as a separate race, survive many more centuries in Europe. It is estimated that there are about 700,000 gypsies in Europe. Asia and Africa have untold thousands of these nomads. They are found also in N. and S. America, and even in New Zealand and Australia. A small portion only of gypsies occupies as a body fixed habitations in Hungary and Transylvania, where they are agriculturists and goldwashers; and in the Principalities, where they live in a kind of serfdom, and are divided into four different classes—Rudari or Aurari (gold-seekers), Ursari (bear-leaders), Lingurari (manufacturers of and dealers in wooden spoons, mouse-traps, etc.; and Laîessi (masons, smiths, tinkers, etc.). All the rest lead a roaming life, live in kennels and under tents from one end of the year to the other, gaining their scanty livelihood, like their forefathers, as best they can, fearing and detesting nothing so much as a fixed and continuous occupation, which would take them away from 'their free

mountains, their plains and woods, the sun, the stars, and the winds.'

The following is a specimen of their language in the form of a short improvised stanza:

Poraquel luchipen abajo
Abillela un ba lichoró,
Abillela á goli goli,
Ustilame Caloró.

There runs a swine down yonder hill
As fast as e'er he can,
And as he runs, he crieth still:
'Come steal me, gypsy man.'

GYP'SY-WORT (*Lycopus Europæus*): perennial plant of nat. ord. *Labiatæ*, with stem about two ft. high; opposite, ovato-lanceolate: scarcely stalked, almost pinnatifid, wrinkled leaves; and dense whorls of small whitish flowers with purple dots, the limb of the corolla 4-cleft and nearly equal; only two stamens perfect. It grows in ditches and wet places, on the continent of Europe. It is a febrifuge. The juice stains cloth a permanent black color, and gypsies are said to use it to give a dark hue to their skin, whence the English name gypsy-wort and the French *Herbe des Bohémiens.*

GYRACANTHUS, n. *jī'ră-kăn'thŭs* [L. *gyrus;* Gr. *guros*, a circle; *akantha*, a spine]: in *geol.*, a genus of gigantic fin-spines of the Carboniferous formation, the groovings on which run in a spiral manner from the base upward.

GYRATE, a. *jī'rāt* [L. *gyrus;* Gr. *guros*, a circuit or compass, a circle]: winding or going round, as in a circle: V. to whirl round; to revolve round a central point. GY'RATING, imp. GY'RATED, pp. GY'RAL, a. *-răl*, whirling. GYRA'TION, n. *-rā'shŭn*, a circular motion; a turning or whirling round. GYRATION, CENTRE OF: see CENTRE OF GYRATION. GY'RATORY, a. *-tėr-ĭ*, moving or whirling in a circle. GYRE, n. *jīr*, a circular motion; a circle described by a moving body. GYRED, a. *jīrd*, falling in rings.

GY'RATION, RADIUS OF. The energy required to set a body in rotation in any given manner depends on the arrangement of the mass of matter to be rotated. Thus, a mass made into a ring like a wheel with very light spokes requires the expenditure of more energy in order to set it to rotate once per second on its axis than would be required if the same amount of matter were made into a uniform circular plate of the same radius. The energy required to set any given body in rotation about any given axis depends, in fact, on the moment of inertia of the given body about that axis; and the mass of the body being given, the moment of inertia depends on the way in which the mass is disposed about the axis of rotation. The radius of gyration about a given axis is the distance from that axis at which the whole of the matter of the given body might be concentrated without altering the moment of inertia. The moment of inertia and radius of gyration for any given

body about any given axis may be calculated mathematically. The two magnitudes are evidently of great importance in the theory of rotating bodies.

GYRENCEPHALA, n. plu. *jī′rĕn-sĕf′ă-lă* [Gr. *gurŏō*, I curve or bend; *engkĕph′ălŏs*, the brain]: a section of the mammalia, in which the cerebral hemispheres are abundantly convoluted.

GYR-FALCON, or JER-FALCON or GERFALCON, n. *jĕr-faw′kn* [Ger. *geier*, vulture, hawk], (*Falco gyrfalco*): a species of Falcon (q.v.) of the northern group, of large size, the female, which is the largest, being about two ft. in entire length; the plumage almost brown when the bird is young, but gradually changing to white as it advances in age, the white margin of each feather encroaching on its brown centre, until aged birds are almost pure white. It inhabits all the very cold northern parts of the world. It was formerly in high esteem for falconry, and was procured at great expense from Iceland and Norway. It is closely related to the Iceland Falcon (*F. Islandus*) and to the Greenland Falcon (*F. Candicans*).

GYRINUS, *jĭr-ī′nŭs:* Linnæan genus of coleopterous insects, now constituting a family, *Gyrinidæ*, closely allied to *Dytiscidæ*, or Water Beetles (see DYTISCUS), but differing in having the antennæ very short, the two fore-legs stretching forward like arms, the other legs very short and comparatively broad. The eyes are divided by horny processes, so that each of them almost becomes two. The body is oval, as in the *Dytiscidæ*. The *Gyrinidæ* are generally characterized by metallic brilliancy of color. They are mostly small. They fly well, swim and dive well, spend the winter in the mud at the bottom of ponds, and in spring and summer may be seen swimming very actively on the surface of the water, ready to dive on the slightest alarm. In diving, they carry down with them a bright bubble of air. They generally swim in little parties, seeming to chase each other in circles, whence their French name *Tourniquets*, and their English name, *Whirligigs*. They feed on smaller aquatic animals, which they seize in their gyrations. They deposit their eggs on the leaves of aquatic plants. Their larvæ are aquatic, having their bodies composed of 13 deeply divided rings, of which three bear the feet, and the rest bear filaments probably serving as organs of respiration. The species *Gyrinus natator* is a smooth shining blackish insect, three lines long.

GYRODUS, n. *jī′rō-dŭs* [Gr. *guros*, a circle; *odous*, a tooth]: in *zool.*, a genus of thick-toothed fishes, so termed from their circular grinding teeth. GYROG′-ONITES, n. plu. *-rŏg′ō-nītz* [Gr. *gonos*, seed]: the spiral seed-vessels of plants allied to the chara, and found fossil in the fresh-water tertiaries.

GYROMA, n. *jī′rō-mă* [Gr. *gurōmă*, a circle—from

gūros, round]: the annulus or ring around the sporecase of ferns.

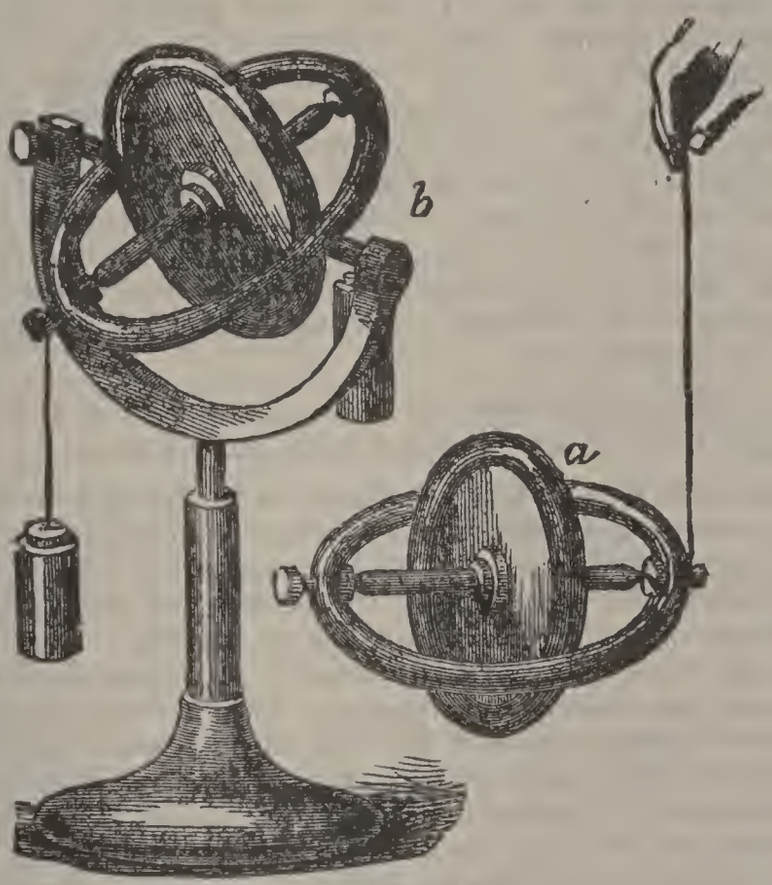
GYROMANCY, n. *jī'rō-măn'sĭ* [Gr. *guros*, a circuit; *manteia*, divination]: method of divination by means of a circle, generally performed in the following manner: the soothsayer described a circle, and marked it all round with letters; then he commenced to walk round the circle, repeating his incantations, and at the places where he stopped the letters were carefully noted, and by the interpretation put upon these letters, the answer of the god was obtained.

GYROPH'ORA. See TRIPE DE ROCHE.

GYROSCOPE, n. *jī'rō-skōp* [Gr. *guros*, a circuit; *skŏpĕō*, I see]—GYROSTAT, n. *jī'rō-stat* [Gr. *guros*, a circuit; *stătŏs*, that stands, standing still]: instrument for the exhibition of various properties of rotation and the composition of rotations. It differs from a top in having both ends of its axis supported. The invention is probably French or German, and in some of its forms it dates from about the end of the 18th century; but no certain information can be obtained on these points. Following are two of its many applications.

First, if a mass be set in rotation about its principal axis of inertia of greatest or least moment, it will continue to revolve about it; and, unless extraneous force be applied, the direction of the axis will remain unchanged. Such, for instance, would be the case with the earth, were it not for the disturbances (see NUTATION and PRECESSION) produced by the sun and moon: the direction of the axis would remain fixed in space (i.e., the pole-star would be always the same star), in spite of the earth's motion in its annual orbit. It is for this very reason that modern artillery is rifled, so that the projectile revolves about its axis. If, then, a mass of metal, as, for instance, a circular disk, loaded at the rim, and revolving in its own plane, be made to rotate rapidly about its axis of greatest moment of inertia, and if it be freely supported (in gimbals, like the box of a compass), the direction of its axis will be the same so long as the rotation lasts. It will therefore constantly point to the same star, and may, of course, be employed to show that the apparent rotation of the stars about the earth is due to a real rotation of the earth itself in the opposite direction. This application was made by Foucault shortly after his celebrated Pendulum (q.v.) experiment, and he is generally looked upon as its inventor. The *Transactions of the Royal Scottish Society of Arts*, however, show that this application of the gyroscope was made many years before (1836, Mar.), by E. Sang, C.E. It is, in practice, not a perfect mode of proving the earth's rotation as the Foucault pendulum; but this arises solely from unavoidable defects of workmanship and materials—the mass of the gimbals, and the

friction on the pivots. Prof. Smyth, Scottish astronomer-royal, has recently applied this property of the gyroscope to the improvement of our means of making astronomical observations at sea. A telescope, mounted on the same support as the ends of the axis of the gyroscope, will, of course, be almost unaltered in position by the rolling or pitching of a vessel; and a steady horizon, for sextant observations of altitude, is procured by attaching a mirror to the support of the gyroscope, and setting it once for all by means of spirit-level. The mechanical difficulties of construction have not yet been quite overcome but there is little doubt that this application will some day be of very great practical value.



Gyroscope.

But the most singular phenomena shown by the gyroscope are those depending on the *composition* of rotations. We have already seen (ROTATION) that any motion whatever of a body which has one point fixed is of the nature of a rotation about an axis passing through that point. Hence, simultaneous rotations about any two or more axes, being a motion of some kind, are equivalent to a rotation about a single axis. The effect, then, of impressing upon the frame in which the axis of the gyroscope is suspended a tendency to rotate about some axis, is to give the whole instrument a rotation about an intermediate axis; and this will coincide more nearly with that of the gyroscope itself, as the rate of its rotation is greater. It is hardly possible to explain

to the non-mathematical reader the exact nature of the compound motion, which consists in the rolling of an imaginary cone fixed in the gyroscope upon another fixed in space; but the rotation of the axis of a top round the vertical, (when it is not 'sleeping' in an upright position), and the precession of the earth's axis, are precisely similar phenomena. Thus, when the gyroscope is spinning, its axis being horizontal, a weight attached to the framework at one end of the axis (Fig. *b*) makes the whole rotate about the vertical; attached to the other end, the rotation takes place in the opposite direction. And the framework may be lifted by a string attached near one end of the axis (Fig. *a*) without the gyroscope's falling. Its axis still projects horizontally from the string, but it revolves as a whole round the string. Various other singular experiments may be made with this apparatus; and others, even more curious, with the gyrostat of W. Thomson (q.v.), which is simply a gyroscope inclosed in a rigid case, by which the ends of its axis are supported. When a gyrostat is made the bob of a pendulum under certain conditions, the plane of vibration of the pendulum turns, as in Foucault's celebrated experiment, but in general at a much greater rate.

GYROSE, a. *jī-rōs'* [Gr. *guros*, a circle]: in *bot.*, turned round like a crook; marked with wavy lines.

GYROVAGI: class of monks in w. Europe in the early days of monasticism; so named from their wandering or circulating habits. The manner of life and work prescribed by St. Anthony for the inmates of the monasteries led to many humane and useful results. But as the number of communities increased, all manner of excesses sprang up among the inmates; and various bands were formed whose numbers forsook the monastic institutions and discipline, and sought independent existence. These had no fixed habitation. They wandered from one cell, hermitage, or abbey to another, begging food and shelter from their more rigorous brethren, bringing great scandal to the conscientious devotees, and often creating public trouble. Among these bands were the *euchites*, professing the observance of continual mental prayer; *enthusiasts*, pretending to hold spiritual communications; *choreutes*, practitioners of mystical dancing; and *circumcelliones*, rambling 'seekers after the crown of martyrdom' by means of pillage, arson, and murder. All were classed as Gyrovagi. Augustine and Cassianus wrote against them. Columbanus and others condemned them and they became restrained and finally disappeared.

GYVES. n. plu. *jīvz* [W. *gefyn*, fetters: Gael. *geimheal*, chain, a fetter]: shackles or iron fetters for the legs. GYVE, v. *jīv*, to fetter; to shackle. GY'VING, imp. GYVED, pp. *jīvd*.

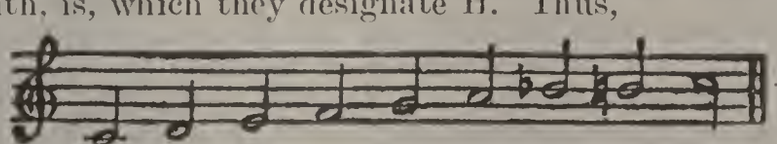
H.

H, or h, *āch:* a consonant, eighth letter of the English alphabet. It belongs to the order of gutturals, and is a mere attenuation of the sound indicated by the Greek χ and the German (and Scotch) ch. The tendency of guttural sounds to become lighter and at last disappear, is strikingly seen in tracing the history of the letter *h*. The form of the character corresponds to the Phœnician or Hebrew *cheth* (ח) and the Greek *eta* (Η, probably at one time pronounced *heta*), which denoted originally the *syllable che*. The Greeks dropped the guttural part of the sound, and took the character to mark the vowel *ē*, while in the Latin alphabet it was taken to mark the (faint aspirated) guttural. That the sound of *h* in Latin must have been faint, is proved by the fact, that many words were written indifferently with or without an *h*; as *honustus* or *onustus; aheneus* or *aëneus*. In the languages derived from the Latin, the force of *h* has almost disappeared. It is retained in French as a character, but is hardly heard in pronunciation. The Italian language altogether ignores the character. In Spanish, it has taken the place in many cases of the Latin *f*, as *hijo*=Lat. *filius*, a son; *humoso*=*fumosus*, smoky.

In the languages of the Gothic stock, *h* often represents the hard guttural sound of *k* or *c.*: see letter C. This substitution and the subsequent disappearing of *h*, especially before *r* and *l*, have completely disguised the relationship of many words which are yet of the same root: e.g., Eng. *raw;* Ang.-Sax. *hreaw;* Lat. *cru* or, blood, *cru*-dus, bloody, raw.

The natural tendency in English, as in other tongues, is to attenuate the sound of *h*, and altogether eliminate it. This tendency is strongest among the illiterate, who are unrestrained by the presence of the written character; and accordingly 'to drop one's *h's*' (e.g., *am* for *ham*) is a sign of the want of education and vulgarity. The perversity of putting *h* where it ought not to be (e.g., *heggs* for *eggs*), is not easily accounted for. These two faults are not common in the United States.

H, in Music, is used by the Germans for the same note which we call B, while they call our B flat simply B; possibly from the flat seventh being more related to C, as a fundamental note, than B natural, the sharp seventh, is, which they designate H. Thus,



C D E F G A B H C

HA! int. *hâ* [an imitative word: O.Fris. *haha*, expressing laughter]: a word expressing wonder or surprise; when repeated in rapid succession, it expresses laughter or joyous exultation: N. the interjection so sounded. HA-HA, n. also written HAH-HAH, n. *hâ-hâ*, and HAW-HAW, n. *haw-haw*, in *landscape gardening*, a sunken fence, so named as indicating the surprise expressed when the division is unexpectedly discovered. *Note.*—The form HAW-HAW is said by Skeat to be simply the reduplication of the word *haw* as derived from Icel. *hegi*, a hedged field; Sw. *hage*, an inclosed pasture-ground; Dut. *haag*, a hedge,—thus signifying 'a hedge or fence': see HAW 1.

HAAF, a. *hâf* [Icel. *haf;* Dan. *hav*, the sea]: pertaining to the deep-sea fishing off the Orkney and Shetland Islands—called the *haaf-fishing:* N. the deep-sea; a deep-sea fishing-bank.

HAARLEM, *hâr'lēm:* chief town of a dist. of the same name in the prov. of N. Holland; a clean, well-built city, on the shores of the Spaarn, 12 m. w. of Amsterdam, 5 m. from the German Ocean; intersected, like most Dutch towns, with canals and avenues of trees. Haarlem is the seat of govt. for the province, and the see of a Rom. Cath. bishop. Among its 13 churches, the principal is the Great or St. Bavo's Kerk, built in the 15th c., one of the largest in Holland, and specially noted for its lofty tower and famous organ, constructed 1735–38 by Müller of Amsterdam, which, till abt. 1850, was the largest in the world, having 5000 pipes, 64 stops, and four banks of keys; it is still notable for sweetness of tone. Before the church stands a statue of Laurens Coster (q.v.), to whom his cŏuntrymen ascribe the invention of printing. Among buildings of note are the town hall, with its fine carvings, formerly the residence of the Counts of Holland; the palace of the states-general; the prison; and the Teyler Institution, richly endowed to defend the Christian religion and promote science and the fine arts: it has also a handsome building occupied by 24 poor old women, and has numerous scientific and antiquarian collections. Haarlem has a good gymnasium, numerous academical, scientific, and benevolent institutions, and a national normal school for training teachers. Although no longer celebrated, as in former times, for flourishing trade, it still has extensive refineries of salt, tanneries, foundries for type, various manufactories of silk, linen, and thread, and an extensive trade in flowers, sending its tulips, hyacinths, and other bulbs, to the value in some years of $200,000, to every part of Europe. Haarlem was a flourishing town as early as the 12th c., when it took an important part in the wars between the Hollanders and the West Frisians. At the close of the 15th c., it lost its privileges, and suffered severely during the revolt of the peasantry; and during the war of independence,

it underwent seven months' siege 1572–3, unparalleled in history for the heroism of the citizens. The wood or grove of Haarlem is a great ornament to the city, and a favorite place for recreation. Haarlem has railway communication with Amsterdam, Rotterdam, and the Nieuwe Diep. Pop. (1901) 66,827. Nearly one-half of the people are of the Dutch Reformed Church, and about one-third are Roman Catholics.

HAARLEM LAKE, or HARLEMMER MEER, *hâr'lĕm-mĕr mār*, now drained (see POLDER), lay between the towns of Haarlem, Leyden, and Amsterdam, and communicated with the Zuider Zee by 'Het Y.' Before its drainage (1839–52), it embraced the four lakes of Haarlem, Leyden, Spieger, and Helle, which, in consequence of an irruption of the sea in the 16th c., when several villages were destroyed, had merged into one vast sheet of water, and in the course of time encroached so far upon the adjacent land as ultimately to cover more than 60,000 acres. The depth did not exceed 15 ft., more than half of which was composed of mud and clay, from which the Dutch prepared a kind of brick known as 'klinkers,' used for paving. The lake frequently rose during storms to an alarming height, necessitating a large annual outlay in keeping the dams and sluices in repair. In consequence of the damage done to Amsterdam and Leyden by an overflow of the lake 1836, the government entered into an agreement with a company of English engineers to drain it. This undertaking was effected by several gigantic steam-engines, by which the water was pumped up into a canal, formed round the circumference of the lake, and connected with the Ij by various outlets. By these means the waters were drained off, except channels for drainage, and more than 50,000 acres of good land reclaimed, producing large crops of colza, flax, wheat, rye, barley, oats, madder, mustard, and other seeds. The enterprise cost more than $5,000,000, but the sale of the lands reduced this outlay by nearly $3,800,000.

HABAKKUK, *hăb'ăk-kŭk* or *hă-băk'kŭk:* (Greek forms, *Ambakoum*, *Abacum*, etc.; Latin, *Ambacum*, *Ambacuc*, and *Abacuc*): eighth of the 12 minor prophets of the Old Testament. No account whatever is given in the book itself of the events or the date of his life; but iii. 19, shows him to have been a Levite; and Delitzsch maintains, with probability, that the work was composed shortly after B.C. 650.

In the book, the prophet, first of all, bewailing the general corruption of his people, prophesies the speedy vengeance of God by the hand of the Chaldeans. These, however, shall, when they have fulfilled the divine wrath, perish suddenly themselves, because of their own iniquities; and the prophet gives thanks for this just retribution on the enemies of God's chosen nation. The various chapters have been supposed to have been written

under different successive kings (Rosenmüller, Kalminsky, etc.); but the unity of the whole book is so obvious, that this notion has been almost unanimously rejected.

Critics have, in all times, been unanimous in their praise of the style of this prophetic composition. It ranks, indeed, for grandeur and sublimity of conception, for vigor and fervor of expression, for gorgeousness of imagery, for melody of language, among the very first productions of sacred literature. It is especially the peculiar strophic arrangement of chap. ii., with its awful four 'woes' denounced against the Chaldeans, and above all, that matchless 'Pindaric Ode,' as Ewald calls the anthem in chap. iii., which have challenged universal admiration. Daniel Webster declared the imagery of Habakkuk unsurpassed in all literature.

HABBLE, n. *hăb'l:* in *Scot.*, a squabble; a mob-fight; a street row; V. to put into a state of perplexity; to confuse. HABBLING, imp. *hăb'lĭng.* HABBLED, pp. *hăb'ld.*

HABEAS CORPUS, *hā-bĕ-ăs kŏr'pŭs,* WRIT OF (L. *habĕas,* you may have; *corpŭs,* the body]: writ directed by courts of law or equity to produce the body of a person who may be probably supposed illegally detained, and to state the reasons of such detention, so that the court may judge of their sufficiency. This writ is one of the chief guards of the liberty of the citizen in Britain and in the United States, and is the envy of foreign nations, being one of the best securities against tyranny ever devised. It is often erroneously supposed that this efficacious protection of personal freedom was bestowed first by the statute of 31 Ch. II. c. 2, called the Habeas Corpus Act. But the true foundation of that act, as well as of many other cardinal principles of the English constitution, is in the Great Charter, or Magna Charta, of which Hallam (1 *Const. Hist.* 16) observes: 'No freeman could be detained in prison except upon a criminal charge on conviction, or for a civil debt. In the former case, it was always in his power to demand of the Court of King's Bench a writ of *habeas corpus ad subjiciendum,* directed to the person detaining him in custody, by which he was enjoined to bring up the body of the prisoner, with the warrant of commitment, that the court might judge of its sufficiency, and remand the party, admit him to bail, or discharge him, according to the nature of the charge. This writ issued of right, and could not be refused by the court.' The Great Charter, as Prof. Creasy sums up this part of its substance, 'contained two great principles. First, that no man shall be imprisoned on mere general grounds of suspicion, or for an indefinite period, at the discretion or caprice of the executive power; but that imprisonment shall be only inflicted as the result of a legal trial and sentence, or for the purpose of keeping in safe custody, when necessary, an accused person on a definite charge,

until he can be tried on that charge. Secondly, that, as a general rule, every person accused of a criminal offense shall have the question of his guilt or innocence determined by a free jury of his fellow-country-men, and not by any nominee of the government.' And Blackstone, with great spirit, thus discourses on the social and political effects of this feature of the British constitution (1 Bl. *Com.* 135): 'Of great importance to the public is the preservation of this personal liberty, for if once it were left in the power of any the highest magistrate to imprison arbitrarily whomever he or his officers thought proper, there would soon be an end of all other rights and immunities. Some have thought that unjust attacks, even upon life or property, at the arbitrary will of the magistrate are less dangerous to the commonwealth, than such as are made upon the personal liberty of the subject. To bereave a man of life, or by violence to confiscate his estate without accusation or trial, would be so gross and notorious an act of despotism, as must at once convey the alarm of tyranny throughout the kingdom; but confinement of the person by secretly hurrying him to jail, where his sufferings are unknown or forgoten, is a less public, a less striking, and therefore a more dangerous engine of arbitrary government. And yet, sometimes, when the state is in real danger, even this may be a necessary measure. But the happiness of our constitution is, that it is not left to the executive power to determine when the danger of the state is so great as to render this measure expedient, for it is the parliament only or legislative power that, whenever it sees proper, can authorize the crown, by suspending the *Habeas Corpus* Act for a short and limited time, to imprison suspected persons, without giving any reason for so doing.' The Habeas Corpus Act, passed in 31 Ch. II. c. 2, therefore did not introduce any new principle, but merely defined with greater precision and detail the appropriate remedies, in consequence of the frivolous objections made by the judges of the preceding reign.

The result is, that in all cases whatever in England, and similarly in the United States, where a person, whether man, woman, or child, is presumed to be illegally confined, the remedy is for some friend to appeal for a *habeas corpus*, which, on a good *prima facie* case, will be issued to the person who is so presumed illegally to confine the applicant; and if such person refuses to make a proper return—that is, show good legal grounds for what is done—he will be committed for contempt. If the party is confined under recognized authority, as a child by a parent, these facts must be stated. If the party is confined under some legal authority, then the warrant of commitment must be produced, and the rule is that such warrant must set forth the subject-matter, and the jurisdiction of the judge or justice

who so committed the party, so that the legality of the imprisonment may be judged of.

In Scotland the Wrongous Imprisonment Act, 1701, c. 6, which works to the same effect, is often called the Scotch Habeas Corpus Act.

Habeas Corpus is the formal commencement also of several other legal writs of kindred nature to that above mentioned; but the above, strictly called the writ of *habeas corpus ad subjiciendum*, is the famous remedy against violation of personal liberty. Thus, *Habeas corpus ad respondendum* is a writ issued by a common law court to bring up a prisoner to serve him with a writ in another action. *Habeas corpus ad satisfaciendum* is a similar writ to take the prisoner in execution for another cause of action. *Habeas corpus ad testificandum* is the writ by which a prisoner is brought up by the jailer to give evidence as a witness in a court of justice.

The constitution of the United States provides (Art. I., sec. 9) that the privilege of the writ of *habeas corpus* shall not be suspended unless when, in cases of rebellion or invasion, the public safety may require it; and the same regard for personal liberty is similarly manifested in nearly all the states. Since the adoption of the federal constitution several occasions have arisen when the writ has been suspended; and an interesting line of argument has been drawn by some of the most eminent constitutional lawyers in the country as to whether the suspending power was invested in the pres. or the congress. In 1861 President Lincoln authorized Gen. Scott to suspend the writ under certain contingencies; and Chief Justice Taney issued a writ of *habeas corpus* in the case of a citizen in Baltimore who was under arrest by a U. S. officer on a charge of treason, which writ the general to whom it was directed declined to recognize on the ground that the pres. had suspended the privilege. The chief-justice, holding that congress, not the pres., had the sole power to suspend, was supported by Deady and Smalley; while Horace Binney, Reverdy Johnson, and others held opposite views. Congress, however, passed an act (1863, Mar. 3) authorizing the pres. to suspend the writ, and under this act it was suspended by proclamation by the pres. 1871, Oct. 17, and Nov. 10.

HABENDUM, *hă-bĕn′dŭm*, in Law: name of a clause in a deed of grant or lease, in which clause the kind and nature of the estate is described, and it is stated for how long the estate is to be held.

HABERDASHERY, n. *hăb′ėr-dăsh′ėr-ĭ* [Icel. *hapurtask*, things of trifling value—from *haprtask*, a haversack, or bag to carry oats or provisions in: Icel. *taska*, a chest, a pouch]: originally pedlers' wares as carried in a sack; small-wares, woolen drapery goods, etc. HAB′ERDASHER, n. a dealer in soft goods, as woolens, linens, silks. HABERDASH, v. *hăb′ėr-dăsh*, in *OE.*, to deal or trade as

a haberdasher. HAB'ERDASHING, imp. HAB'ERDASHED, pp. *-dăsht.*

HABERDINE, n. *hăb'ėr-dĭn* [F. *habordean;* Dut. *aberdaan*]: a kind of cod-fish cured; poor-john. *Note.*—*Poor-john* seems to be a corruption of F. *habordean* by cutting away the first syllable *ha.*

HABERE FACIAS POSSESSIONEM, *ha-bēr'ĕ fā'shĭ-ăs pŏs-sĕs-shĭ-ō'nĕm,* in Law: writ which issues after a successful plaintiff has recovered judgment in an action of ejectment. He then calls on the sheriff, by this writ, to put him in the possession of the land or premises, and the sheriff executes it by breaking open the doors, if necessary, and then delivering over the possession to the plaintiff.

HABERGEON, n. *hăb'ėr-jŭn* [F. *haubergeon,* originally a little coat of mail (see HAUBERK)]: a short coat of mail, consisting of a jacket without sleeves, to defend the neck or breast. In early times, the habergeon was composed of chain-mail; but in the 14th c., a habergeon of plate-armor was worn over the hauberk. See HAUBERK.

HABERSHAM, *hăb'ėr-sham,* JOSEPH: 1751, July 28—1815, Nov. 17; b. Savannah: statesman. He was active in pre-revolutionary movements, helped seize the powder in the royal magazine in Savannah for the patriots, was a member of the Ga. council of safety, commanded a party that arrested Gov. Wright and confined him to his house, became maj. 1st Ga. battalion, defended Savannah against a royal naval attack 1776, Mar.; and was lieut.col. at the close of the war. He was speaker of the state assembly 1785–90, and postmaster-gen. of the United States 1795–1802.

HABILIMENT, n. *hă-bĭl'ĭ-mĕnt* [F. *habillement,* clothes —from *habiller,* to dress: L. *habĭtŭs,* dress]: a garment; clothing. HABIL'IMENTS, n. plu. garments or dress in general.

HABILITY, n. *hă-bĭl'ĭ-tĭ* [L. *habĭlĭtas,* ability]: in *OE.,* aptitude; ability.

HABIT, n. *hăb'ĭt* [OF. *habit,* a garment, a raiment: L. *habĭtŭm,* state of the body, dress—from *hăbĕō* I have, I possess: F. *habit,* a suit of clothes]: dress; the particular state of the body; a coat with a long skirt worn by ladies on horseback; the tendency to any action or practice occasioned by custom or frequent repetition; manner; way; in *bot.,* the general external appearance of a plant: V. to dress or array. HAB'ITING, imp. HAB'ITED, pp. HABITUAL, a. *hă-bĭt'ū-ăl* [F. *habituel:* OF. *habitual*]: formed or acquired by habit; customary; usual. HABIT'UALLY, ad. *-lĭ.* HABIT'UALNESS, n. HABIT'UATE, v. *-ū-āt* [mid. L. *habitŭātus,* brought into a certain condition]: to accustom; to make familiar by frequent use or practice. HABIT'UATING, imp. HABIT'UATED, pp. *-ā-tĕd.* HABIT'UA'TION, n. *-ā'shŭn.* HAB'ITUDE, n. *-tūd* [F.—L.]: state with regard to something else;

long custom. HABIT-MAKER, a tailor who makes long cloth riding-dresses for ladies. HABIT-SHIRT, a thin muslin or lace garment worn over the neck and breast by women. HABIT AND REPUTE, in *Scots law*, whatever is generally received as matter of fact; known to be acting or living in a certain way, as, a person may be married by *habit and repute*, and the crime of theft is aggravated by *habit and repute*.—SYN. of 'habit, n.': custom; fashion; method; mode; practice; usage; prescription; attire; apparel; array; costume; clothes; clothing; vestment; vesture; habiliment; raiment; garment; guise; garb; temperament; conduct; disposition; character;—of 'habitual': accustomed; common.

HABIT: a mode of conduct or thinking acquired during the life-time of an organism. The acquisition of habits is possible because of the plasticity and retentiveness of organic materials. 'Plasticity means the possession of a structure weak enough to yield to an influence but strong enough not to yield all at once.' Nervous tissue has a special aptitude for acquiring habits, an aptitude which is greatest when the nervous system is most plastic, that is, during immaturity. A nervous impulse, once having passed over a given pathway, tends to traverse the same pathway again, upon occasion. When a horse sees a paper in the road he may shy. The same stimulus will have a tendency to evoke the same reaction at a later time until a habit of shying at paper, or of shying at a particular place in the road, is formed. At bottom this is a physiological fact, and the action is only partially controllable by conscious effort. The formation of a habit may be avoided by the avoidance of the stimulus which leads to the undesirable discharge; by substituting some stronger connection with the stimulus; or sometimes by resolute inhibition of the impulse to act in response to the stimulus. A drunkard's nervous system discharges motor impulses into his leg muscles, and he is carried into the saloon when he reaches the accustomed street. He may avoid the sight and smell of the saloon and so avoid the impulse to go in; he may substitute the smoking and chewing activity for the drinking, when the impulse is on; or he may resolutely turn away and refuse to yield to the habit, keeping strongly in mind the reasons for his reform.

Organic materials retain impressions once made. This is a physical and physiological law. Good impressions are retained as well as evil, good ideas become permanently associated as well as evil. Co-ordinated movements, memory, and the association of ideas, in other words all intelligent actions, are possible because it is the nature of the nervous system to form habits.

Individual nervous systems differ as to plasticity and retentiveness; this difference being native cannot be changed by training. Special habits may be formed by

(a) reiteration; (b) concentrating attention upon them at the beginning; (c) giving them strongly pleasurable accompaniments; (d) forbidding exceptions to the habit. Habits are more easily formed during good health. The breaking of a habit means only the formation of a habit of not behaving in a given way. Habits of acting presuppose habits of thinking and feeling. But when a habit of action has once been formed the act will occur without thought, unless something interferes with it.

HABITABLE, a. *hăb'ĭ-tă-bl* [F. *habitable*—from L. *habitābĭlĭs*, habitable—from *hăbĭtārĕ*, to have possession of, to inhabit]: that may be dwelt in. HAB'ITABLENESS, n. *-bl-nĕs*, capacity of being inhabited. HAB'ITANCY, n. *-tăn-sĭ*, abode; legal settlement. HAB'ITAT, n. *-tăt* [L. *hăbĭtăt*, it inhabits]: dwelling; the natural locality of an animal or plant in its wild state. HAB'ITA'TION, n. *-tā'shŭn* [F.—L.]: a place of abode; a house; a residence; in the *Roman law*, a servitude by which a person could use a house only as a habitation or dwelling, and for no other purpose. HAB'ITANCE, n. *-tăns*, in *OE.*, dwelling; abode.

HABITANT, n. *hăb'ĭ-tănt* [F. *habitant*—from F. *habiter*, to dwell—from L. *habĭtārĕ*]: in *OE.*, an inhabitant.

HABITATION. In civil law, the right of an individual to live in a house owned by another person without prejudice to the property.

HABITUAL CRIMINALS. Persons who are so well-known as malefactors by reason of their criminal past history and associations as to be punishable by penalties of more severity than are ordinarily imposed upon persons who have no such record against them.

HABITUE, n. *â-bē-tü-ā'* [F. pp. of *habituer*, to accustom]: one who habitually frequents any place, especially a place of amusement or recreation.

HABLE, a. *hā'bl* [L. *hăbĭlĭs*, manageable, suitable]: in *OE.*, fit; apt.

HABNAB, ad. *hăb'năb* [AS. *habban*, to have; *nabban* =*ne habban*, not to have]: in *OE.*, hit or miss; at random; by mere chance.

HABROMANIA, n. *hăb-ro-mā'nĭ-a* [Gr. *habros*, pretty, pleasant; *mania*, madness]: form of insanity in which the delusions are pleasant or gay.

HABRONEME, a. *hăb'ro-nēm* [Gr. *habros*, graceful, delicate; *nema*, yarn] in *mineral.*, having the form of fine threads.

HACHEL, n. *hăch'ĕl* [etym. doubtful]: a sloven; a dirty, untidy person.

HACHURE, n. *hăchūr* [F. *hachure*, hatching in engraving—from *hache*, a hatchet]: the shading on maps to represent mountains, etc.

HACIENDA, n. *hăs'ĭ-ĕn'dă*, or *â'thē-ĕn'dă* [Sp.]: in *Sp. Amer.*, an isolated farmhouse with surrounding land.

HACK, n. *hăk* [Sp. *haca;* OF. *haque*, a pony: F. *haquenée*, an ambling horse: comp. Gael. *each*=*hăc*, a horse]: a horse or carriage kept for hire; a horse kept for all kinds of work, or for ordinary use; any thing or person overworked on hire; a drudge; anything much used: V. to hire as a hack; to rough ride; to treat roughly. HACKNEY, n. *hăk'nĭ*, HACK'NEYS, n. plu. *nĭz*, a horse kept for hire: ADJ. let out for hire; devoted to common use: V. to use much; to use or convey by a hackney. HACK'NEYING, imp. HACK'NEYED, pp. *-nĭd:* ADJ. used much or in common; worn. HACKNEY-COACH, a carriage exposed for hire. HACK-WATCH, in *nav.*, a good watch with a seconds hand, used in taking observations, to obviate the necessity of constantly moving the chronometer. *Note.*—English HACK, a horse, and as a verb 'to rough-ride,' is a mere modern abbreviation of *hacking*, a horse let out on hire, just as *cab* is an abbreviation of *cabriolet*, and bus of *omnibus*.

HACK, n. *hăk* [F. *hacher*, to mince—from *hache*, a hatchet: Sw. *hacka*, to chap: Dut. *hacken*, to cut up; *hacke*, a spade: Ger. *hacken*, to chop: Dan. *hakke*, to hack, to mince: comp. Gael. *eag*, a notch]: a notch or cut made by the blow of an instrument; in *OE.*, a hesitation or faltering in speech: V. to cut or chop with repeated strokes; to mangle; to notch; to cough in a short broken manner; in *OE.*, to speak with stuttering or hesitation. HACK'ING, imp. HACKED, pp. *hăkt*.

HACK'BERRY. See NETTLE TREE.

HACKBUT, n. *hăk'bŭt*, or HAGBUT, *hăg'bŭt* [OF. *haquebute*, an arquebus: Dut. *haak*, a hook; *bus*, a gun-barrel]: an old kind of musket so named from its bent shape; an *arquebus*, which see.

HACKEE, n. *hăk'ē* [etym. doubtful]: name given to the Ground-squirrel (q.v.).

HÄCK'EL, ERNEST HEINRICH. See HAECKEL, ERNEST HEINRICH.

HACKENSACK, *hăk'ĕn-săk*, New Jersey, city, cap. of Bergen co., on the Hackensack river, and the New York, S. & W., and Erie railroads, 16 m. from New York City. It was settled by the Dutch in the latter part of the 17th century, and during the Revolutionary war it was frequently occupied in turn by both armies, and has many interesting historical associations. There are numerous fine residences with beautiful surroundings; a public library, high school, gas and electric light, water-works, electric street railways connecting with surrounding towns and with New York, and an assessed property valuation of more than $5,000,000. Silk and other articles are manufactured to a considerable extent. Pop. (1910) 14,050.

HACKERY, n. *hăk'ĕr-ĭ:* in *Bengal*, a native cart drawn by oxen.

HACKETT, *hăk'ĕt*, JAMES HENRY: 1800, Mar. 15—1871, Dec. 28; b. New York: actor. He received an academical education, studied in Columbia College one year, read law, engaged in commercial business till financially ruined; and made his first appearance on the stage at the Park Theatre, New York, as Justice Woodcock in *Love in a Village*, 1826. He made a specialty of representing Yankees, western pioneers, and Frenchmen; and with a ludicrous visage and peculiar drawling speech attained popularity at home, and in England, which he visited 1827, 32, 40, 45 and 51. Later he undertook Shakespearian characters, and as Falstaff was at his best. He managed the American tour of the Grisi and Mario opera troupe 1854, and filled his last public engagement, Boston 1871.

HACKETT, JAMES KETELTAS, American actor: b. Wolfe Island, Ontario, Can., 1869, Sep. 6. He is the son of J. H. Hackett (q.v.). He was graduated from the College of the City of New York in 1891, made his début in 1892, became leading man of the Lyceum, New York, in 1896, and appeared in *The Prisoner of Zenda* (1896), *Rupert of Hentzau* (1898), *The Pride of Jennico*, *Don Cæsar's Return*, *The Crisis*, *The Walls of Jericho* (1905–6); etc.

HACKETTSTOWN, *hăk'ĕts-town*, New Jersey, town in Warren co., on the Musconetong river, the Morris & Essex canal, and the Delaware Lackawanna & Western railroad, 63 m. w. of New York. It is pleasantly located in a picturesque region, and contains a number of churches, several academies, public schools, a bank, etc.; also carriage factories, foundries, car-shops, flour and saw-mills, weekly newspapers, and other industries. Pop. 3,000.

HACKING. The dressing-off of the projections on the face of a grindstone which has become so uneven that the effective use of the ordinary pointed grinding tool is rendered very difficult. It is accomplished by means of a chisel-shaped, cross-paned hammer called a hack-hammer, the chief projections being reduced by a series of cross hatchings, or chequered cuts.

HACKLANDER, *hâk'lĕn-der*, FRIEDRICH WILHELM: 1816, Nov. 1—1877, July 6: b. Burtscheid, near Aix-la-chapelle: German poet. After several vicissitudes he began his literary career in Stuttgart, with *Bilder aus dem Soldatenleben im Frieden*, which appeared in the *Morgenblatt*, and has since been translated into several languages. The literary fruits of a journey to the East, on invitation of Baron von Taubenheim, were *Daguerreotypen aufgenommen auf Einer Reise in den Orient* (2 vols., Stuttg. 1842; 2d ed. 1846); and *Pilgerzug nach Mekka*, collection of oriental tales and legends. Later

he published *Wachtstuben abenteuer*, *Märchen*, and a variety of smaller works; and afterwards *Soldatenleben im Kriege* (2 vols. 1849–50). He published numerous romances: *Handel und Wandel* (1850), *Eugen Stillfried* (1852), *Namenlose Geshichten* (1851), etc. Hacklander has been styled the German Dickens. His comedy *Geheimer Agent* has been performed on all the stages of Germany, and translated in Hungarian, Polish, and English. Other of his works are *Ein Winter in Spanien* (1855); *Der neue Don Quixote* (1858); *Künstlerroman* (1866); *Zwölf Zettel* (1867); *Das Geheimniss der Stadt* (1868); the play *Die Marionetten* (1868); *Kainszeichen* (1874).

HACKLE, n. *hăk'l*, or HECKLE, n. *hĕk'l* [Dut. *hekel*, a hackle—from *haak*, a hook: Ger *heckel*—from *haken*, a hook: Fin. *hakyla*, a hackle, a comb: Sw. *haekla*—from *hake*, a hook]: an iron-spiked comb or machine for dressing flax, raw silk, or any flimsy substance (see Heckle); a fly for angling, dressed with feathers or silk: V. to dress flax with a hackle; to tear asunder. HACK'LING, imp.: N. act or process of preparing flax by the hackle. HACKLED, pp. *hăk'ld*. HACKLER, n. *hăk'lẽr*, or HECKLER, n. *hĕk'lẽr*, one who. HACK'LY, a. *-lĭ*, rough, as if hacked; covered with sharp points. HACKLES, n. plu. *hăk'lz*, the long shining feathers from the cock's neck.

HACKLING. In flax-manufacture, hackling is the process of preparing the flax for spinning by the removal of all foreign substances and smoothing and equalizing all the lengths of fibre.

HACKNEY, *hăk'nĭ:* a parish of England, county of Middlesex; now a suburb of London, 3 m. n.n.e. of St. Paul's. It was formerly a favorite suburban residence of London citizens, but the current of fashion has for many years been setting to the west. In its fashionable days, it is said to have given its name to hackney-coaches. See HACK 1.

HACQUETON, n. *hăk'wė-tŏn* or *hăk'tŏn* [OF. *hauqueton*, or *auqueton*, a cloak, stuff: F. *hoqueton:* Ar. *al-gôton*]: in *OE.*, a wadded coat or frock worn under a a coat of mail; a wadded coat worn alone as armor of defense.

HAD: pt. and pp. of HAVE, which see.

HADAD, *hā'dad:* in the Old Testament, a Syrian deity; primarily according to some authorities the king of the gods, the sun. The Syrian kings in Damascus habitually took the name Benhadad (son of Hadad). *Hadadrimmon* is now supposed to be another name for Adonis or Thammuz, one form of the sun-god.

HADDINGTON, *hăd'ĭng-ton:* market-town and royal and parliamentary borough of Scotland, cap. of the county of Haddington; at the foot of the Garleton Hills, on both sides of the river Tyne, about 16 m. e. of Edin-

burgh. The old Abbey Church, a fine Gothic structure in partial ruin, close to the banks of the river, is the most interesting object. John Knox and George Wishart preached in this church. Among principal buildings are the corn exchange, necessarily very commodious, as H. is one of the largest grain-markets in Scotland. The inhabitants are dependent chiefly upon agriculture, but there are nurseries, corn-mills, breweries, tanneries, etc. in the town and vicinity. Pop. about 5,000.

HADDINGTONSHIRE, *hăd'ĭng-ton-shēr*, or EAST LOTHIAN, *ēst lō'thĭ-an:* maritime county in Scotland, n. lat. 55° 4′—56° 5′, and w. long. 2° 25′—3° 2′; bounded n. and e. by the Firth of Forth and the German Ocean, s. and s.e. by Berwickshire, and w. by Midlothian; extreme length about 25 m., breadth about 17; 179,142 acres, or 280 sq. m. In the s. of the county are the Lammermuir Hills, height 1,732 ft. In the n. and n.e. is a strip of level ground of unequal breadth composed of clay and loam, and mostly very productive for all kinds of crops. The climate is excellent on the lower grounds, and the rainfall much under the average. There are few streams of considerable size, the principal being the Tyne, which flows n.e. across the county into the sea at Tyningham. East Lothian has long had high agricultural fame, and has led in introducing improvements in farming. In 1862, Sep., the first steam-plow possessed by a tenant-farmer in Scotland, was introduced into Haddingtonshire, at Ferrygate, Coal and limestone are abundant: the former was wrought in the 13th c., the earliest record in Scotland. Haddingtonshire returns one member to the house of commons. Pop. (1901) 38,665.

Historical interest is confined almost entirely to the battlefield of Dunbar, where Cromwell defeated the Covenanting army 1650; and Prestonpans, where the Pretender defeated the royal troops 1745. Among antiquities are ruins of the Castles of Tantallon, Dirleton, Luffness, Hailes, and Innerwick. The principal towns are Haddington, Dunbar, and North Berwick.

HADDOCK, n. *hăd'ŏk* [OF. *hodot;* Scot. *haddie:* Skeat suggests that HADDOCK may be a mere corruption of AS. *hacod*, a pike, a mullet, in the sense of 'a good fish'], (*Gadus* or *Morrhua Æglefinus*): fish of the same genus with the cod, and resembling it in general appearance. The number of fins is the same as in the cod, three dorsals and two anals. The haddock, like the cod, has a barbule at the point of the lower jaw. The haddock is brown on the back, silvery on the belly; the lateral line is black, and there is a black spot behind each of the pectorals, these spots sometimes extending to meet on the back. A ridiculous legend ascribes these spots to the finger and thumb of St. Peter, and states the haddock to be the fish from the mouth of which he took the tribute-money, 'the inventors of

the legend never adverting to the improbability of a marine fish living in the fresh-water lake of Gennesaret.' The haddock is not even found in the Mediterranean. Nor does it enter the Baltic, though plentiful in the n. parts of the Atlantic Ocean, both on the European and the American coasts, appearing in great shoals at particular seasons, but in size and quality the haddocks taken at one part of the coast differ much from those of another. Those caught in deep water are in esteem. It is taken both by trawl-nets and lines. Pieces of the herring and sand-eel are most attractive baits. The haddock when really of good quality, is perhaps the finest of all the *Gadidæ;* and the numbers taken on some coasts are very great, rendering it important in an economical view. It does not 'take salt' so well as the cod, but is often cured by drying and smoking. In Mar. and Apr. the haddock is out of season; in Oct., Nov., Dec., and Jan., it is in finest condition. Smoked *Finnan Haddocks* or *Haddies* are named from the fishing-village of Finnan or Findon, in Kincardine: they are seen in some American markets.

HADE, n. *hād:* among *miners*, the steep descent of a shaft; the inclination or deviation from the vertical position of a mineral vein: V. to deviate from the vertical; to slope, as a fault, vein, or lode. HA'DING, imp.: N. the amount of deviation from the vertical; the dip in a vein. HA'DED, pp.

HADEN, *hā'dĕn*, FRANCIS SEYMOUR, M.D.: surgeon and etcher: b. London, 1818, Sep. 16. He was educated at Univ. College and at the Sorbonne, Paris; became a member 1842, and fellow 1857, of the Royal College of Surgeons in England; drew up the International Jury report on surgical instruments, the first public document that recommended ovariotomy; and has been vice-pres. of the London Obstetrical Soc. for many years.—Haden is probably best known as an author of numerous art publications and as an accomplished etcher, both lines of work having been undertaken as a relief from the cares of surgical practice and for the purpose of restoring original engraving as it was practiced by the old masters. He has the finest collection of etched work of old masters ever formed, and one of his own plates —*Agamemnon*—brought to his publishers more than $20,000. His publications, partly literary and partly artistic, have been in progress since 1858. Haden visited the United States 1882.

HADES, *hā'dēz*, in Greek Mythology: the god of the lower world, commonly spoken of as Pluto (q.v.); thence the name was applied also to his kingdom, the abode of the departed spirits or shades. See GREEK RELIGION; also HADES (a place of spirits departed).

HADES [Gr. *hādēs*, the unseen]: among the ancients, the abode of the dead; and in modern usage, the place of spirits departed; so named by the Greeks to express

their ignorance concerning the state of the soul after death. They at length came to regard it as a miserable and gloomy state allotted to the dead generally, but thought of as divided somewhat indistinctly; the grossly wicked being banished to its lowest darkest region and subjected to perpetual punishment; while those distinguished for heroic deeds were admitted into its brighter portion, the happy Elysian fields. The whole pagan thought of it, however, was vague. In the Greek translation of the Old Testament *hades* represents the Hebrew *sheōl*, which denotes, first, simply death as calling for all men and carrying them away; then, the state into which the dead are carried, without necessary reference to either the happiness or misery of their lot; yet with most frequent accompaniment of darkness, gloom, and punishment, according to the ignorance and fears of the living, or the guilt of the dead.—In the New Testament the word hades derives its chief importance from the Savior's use of it. When, in pronouncing woe on Capernaum, he contrasted hades with heaven, perhaps he designed only to set forth figuratively the utter degradation of the city as contrasted with its previous great exaltation. But on another occasion, in promising that the gates of hades should not prevail against his church, he must have had reference to the evil powers of darkness in the unseen world. In the parable of the rich man and Lazarus, representing the former as being, after death, in hades and in torment, Christ plainly taught that a part of the dead were in an unhappy state. After his ascension to heaven he declared that he had the keys of death and of hades; and that both of them should, after the final judgment, be cast into the lake of fire. Whatever be the true interpretation of these last words they imply that in the Savior's mind, hades was associated with evil and consequent misery, as indeed it was plainly so associated in the common mind. Yet we must keep in mind that he used also a stronger word—Gehenna (q.v.)—to denote more distinctly the punishment of the wicked (see HELL).

As to the question, Was Christ himself in hades during the interval between his death and resurrection? some reply: 1. The words from Ps. xvi. 10, which the apostle Peter applied to the risen Lord, 'Thou wilt not leave my soul in hades,' imply that it was there for a time, but was not allowed to continue there. To this it is rejoined that the Greek translation which Peter probably used, and the Hebrew original read, 'Thou wilt not abandon my soul *to* hades' (see Thayer's N. T. Lexicon); that is, 'wilt not allow it to enter there.' 2. It is asserted that the apostle Peter teaches that Christ went to hades, I. Pet. iii. 18–20: 'Christ also suffered for sins once . . . ; being put to death in the flesh, but quickened in the spirit; in which also he went and preached unto the spirits in prison, which aforetime were disobedient, when the long-suffering of

God waited in the days of Noah, while the ark was preparing:' (also iv. 6). But it is replied that the meaning of this passage is conceded to be not clear, and that it has long been in debate among scholars; so that in the lack of other scripture teachings on this subject, there is not foundation sufficient for the doctrine that Christ went into hades. When and where Christ's preaching to 'the spirits in prison' took place is answered differently by interpreters: some considering that it was after the crucifixion, and in the prison of hades where the spirits then were; while others believe it to have been before the incarnation, in the days of Noah, and to disobedient men then living on the earth, but who, continuing their disobedience, were in the prison of the unseen world when Peter wrote. It may, however, be said that it is not unreasonable nor unscriptural for us to think of Christ, who took his place fully with men, as going after death into that unseen world which men dying, go. We may thus in general affirm that he went to hades without affirming a detailed doctrine. 3. The 'apostles' creed' is quoted as teaching that Christ, after his death, 'descended into hades.' This cannot be received as final authority even were this clause proved authentic; moreover, while all the rest of the creed (though not known to be of apostolic authorship) can be traced back at least to the 3d c. at Rome, the words, 'He descended into hades,' were not found in the creed even at the opening of the 5th c. An interpolation so late, and, by an unknown hand, may, indeed, convey a truth, but fails to give that truth the authority of an original doctrine of the Christian faith. 4. The only intimations that we have concerning the location of the soul of Christ between his death and his resurrection, were given by himself: first in his assurance to the repenting thief, 'This day shalt thou be *with me in paradise*;' and afterward, in his exclamation to the Father at the moment of death, '*Into thy hands* I commend my spirit.' Neither of these solemn utterances can be held to give a decisive answer to the question in hand. Formerly in the received Greek text and the authorized English version the word *hades* had a place in the apostle Paul's apostrophe, 1. Cor. xv. 55: 'O death, where is thy sting? O hades (grave), where is thy victory?' But in the critical Greek text, and in the revised English version, the passage reads: 'O death, where is thy victory? Oh death, where is thy sting?'

HADITH, *hăd'ĭth* [Arab. new, story, legend, tale; emphatically, Hadith Ar-Rassul]: the traditions about Mohammed the Prophet's sayings and doings, which, as complementary to the Koran, form, with it, the supreme authority for all religious and legal questions of the Mohammedans. Originally, it was not allowed to commit them to writing (like the Mishnah, q.v.); but the danger of their being entirely forgotten in the

course of time, led to their being written down in the first centuries after Mohammed. Those who, notwithstanding, know them well by heart are honored with the title of Hafiz (retainer, keeper). The six principal sources for these traditions are Ayeshah, after the death of Chadija, the prophet's favorite wife; Abu Hureira, his constant companion and servant; Abdallah Ibn Abbas; Abdallah bnu Omar b. Al-Ass; Djaber b. Abdallah Ansari; and Ans b. Malik. The principal and most authoritative collections of these traditions are those of Bochari, Malik, Abu Dhaud, Tarmesi, Nissai, Moslem, and Sojuti. Of these the most important code is the *Sahih* of Bochari, who, it is said, spent 16 years in collecting such traditions, and who singled out, from a number of 60,000, about 7,270.

HADLEY, *hăd'lĭ*, Arthur Twining, American college president: b. New Haven, Conn., 1856, April 23. A son of James Hadley (q.v.), he was graduated from Yale in 1876, and took graduate studies in political science at Yale and the University of Berlin. In 1879–83 he was a tutor at Yale, and during that time wrote for several journals, including the *Railway Gazette* and the *Financial Chronicle*. He was commissioner of labor statistics for Connecticut (1885–87), and was in 1885 a witness before the Cullom State committee which prepared the Interstate Commerce Law. In 1886 he became professor of political science at Yale, and in 1899 was made president of the university. He was president of the American Economic Association for two years. In 1885 he published 'Railroad Transportation: Its History and Laws,' which is everywhere recognized as one of the chief authorities on the subject, and has been translated into French and Russian; his other works include *Report on the Labor Question* (1885); *Economics, an Account of the Relations between Private Property and Public Welfare* (1896), presenting the theories of political economy in accordance with the most modern research and thought; *The Education of the American Citizen* (1901), and *Freedom and Responsibility* (1903). His writings show him to be not only a scholar, but also a man of affairs well acquainted with the business world, and in this regard he is one of the best representatives of the modern type of university president.

HADLEY, Henry K., American composer: b. Somerville, Mass., 1871. He was a pupil of S. A. Emery and G. W. Chadwick in Boston, studied also in Vienna, and in 1895 returned to the United States and was appointed instructor in music at St. Paul's School, Garden City, L. I. His symphony, *The Four Seasons*, received the prizes given by the Paderewski Fund and the New England Conservatory of Boston. His works further include a concert overture *Hector and Andromache;* a symphony, *Youth and Life;* a cantata, *In Music's Praise;* a festival march; trios, quartettes, and more than 150 excellent songs and pianoforte compositions.

HADLEY, James, LL.D.; 1821, Mar. 30—1872, Nov. 14; b. Fairfield, N. J.; philologist. He became hopelessly lame through an accident in his boyhood, and his attention was turned to study. He graduated at Yale College 1842, studied theol. 1843–45, was tutor in Middlebury 1844–5 and Yale College 1845–48, was appointed asst. prof. of Greek in Yale 1848, succeeded Dr. Woolsey as full prof. 1851, and held the chair till his death. His philological attainments were remarkable and gave him a world-wide reputation, as beside a complete mastery of Greek he was well versed in Hebrew, Arabic, Armenian, Sanskrit, Welsh, Gaelic, Irish, Swedish, and the principal modern languages. He was a frequent lecturer on civil law in Yale and Harvard Colleges, member of the American committee for the New Test. revision, a founder of the American Oriental Soc. and its pres. 1870–72, member of the American Philological Assoc., and member of the National Acad. of Sciences. His chief publications were: *A Greek Grammar for Schools and Colleges* (1860): *Elements of the Greek Language* (1869); and posthumously 12 lectures on *Roman Law* (1873) and a posthumous vol., edited by Prof. W. D. Whitney, of 20 *Philological and Critical Essays* (1873).

HADLEY, John: English mathematician: in 1717 made a member of the Royal Soc.; d. 1744, Feb. 15. He was an intimate friend of Newton, from whom, as is now generally supposed, he borrowed the idea of the instrument called Hadley's Quadrant (see Sextant). The honor of having invented the sextant is claimed for Hadley, for Godfrey, and for Newton: for Hadley, because he was the first to construct the instrument, and give a description of it, which he did 1731, before the Royal Soc.; for Godfrey, because, 1730, he presented a gentleman in Philadelphia with a description of the instrument almost coinciding with Hadley's, which description was transmitted to the Royal Soc. 1732; and for Newton, because he, 1727, gave a description of the instrument to his friend Halley, who, for some reason unknown, suppressed it, and it was not until after his death, 1742, that it was discovered. The Royal Soc. decided that Godfrey and Hadley were both entitled to the honor of the invention, and each received a reward of £200.

HADRAMAUT, *hâ-drâ-mawt':* district of Arabia, s. and s.e. of the central desert of the peninsula; the Hazarmaveth of Genesis. No systematic survey or exploration of the dist. has been made, and European travellers have given conflicting reports of its geography and physical features. In general, it may be said to be bounded on the n. by the great desert, n.e. by Onan, s. by the Arabian Sea, w. by Yemen. Its coast line is variously estimated within 200 m., and its inland stretch within 150 m. The surface is low along the

coast, and diversified in the interior with ranges of mountains, deep valleys, and an elevated plateau. The plateau is bisected by the wady Doan, a valley 150 m. long and 35 m. in extreme width, with towns and villages scattered along its entire course. The interior region is very hot, dry, and unhealthful, and the few streams are dry the greater part of the year. Sheep, goats, camels, horses, dates, indigo, corn, wheat, barley, millet, and cotton are raised by various tribes. The seaport is Makallah, which has considerable trade with India and Yemen.

HADRIAN, *hā'drĭ-an* (full name PUBLIUS ÆLIUS HADRIANUS), Roman emperor: A.D. 76, Jan. 24—138, July 10 (reigned 117–138); b. Rome. During the reign of Trajan, his guardian, with whom he was connected by marriage (Hadrian's father, a Roman senator, having married the aunt of Trajan), he filled several high offices in the state. He accompanied the emperor in his wars against Decebalus, where he distinguished himself by bravery; and 117, when Trajan set out on his return to Italy, he was left behind with the army as gov. of the province of Syria. When the intelligence reached Antioch that Trajan had died in Cilicia on his journey home, Hadrian was proclaimed emperor by the army 117, Aug. 11. The state of the empire was extremely critical. Insurrections had broken out in Egypt, Palestine, and Syria; Mœsia in the e., and Mauritania in the w. were invaded by barbarian hordes; while the Parthians had once more asserted their independence, and won several successes over the imperial forces. Hadrian perceiving the advantage of a peaceful policy, wisely resolved to limit the boundaries of the Roman dominion in the e., and concluded a peace with the Parthians, surrendering to them all beyond the Euphrates. In 118, he went to Rome (where he had been acknowledged by the senate), established his authority by liberality toward the people, and suppressed with great severity a patrician conspiracy against his life. The Roxolani (modern Russians), who had made an inroad into Mœsia, were induced to retire by large gifts. In 119, for the purpose of becoming acquainted with the state of the provinces, he commenced his celebrated journey, which he is said to have performed chiefly on foot. He visited Gaul, Germany, Britain (where he built the famous wall extending from the Solway to the Tyne), Spain, Mauritania, Egypt, Asia Minor, and Greece, whence he returned to Rome, 126 or 127, and received the title of *Pater Patriæ*. Hadrian spent the years 132 and 133 in Athens, for which city he had great predilection. After once more visiting Syria, he returned to Italy, and spent the last years of his life at Rome and Tibur. During his last illness at Baiæ, he was subject to violent outbursts of cruelty, to which, as well as to jealousy and pleasure, he was naturally addicted. After the

death of Lucius Ceionius Commodus, whom he had adopted under the name of Lucius Ælius Verus, he appointed Titus Aurelius (afterward emperor Antoninus Pius) his successor. During his reign the army was vigorously disciplined and reorganized, so that the barbarians were not likely to attribute Hadrian's conciliating and peaceful policy to fear or weakness. As a civil ruler, he merits high praise, particularly for the just and comprehensive view he appears to have taken of his duties as a sovereign: hence to him is attributed, more than to any other, the consolidation of the monarchial system of Rome. Hadrian divided Italy into four parts under four consuls, to whom was intrusted the administration of justice. Hadrian erected numerous splendid edifices, the chief of which were—the mausoleum called the *Moles Hadriani*, in Rome (groundwork of the modern castle of San Angelo), the Ælian bridge leading to it, and the magnificent villa at Tibur. He likewise laid the foundation of several cities, the most important of which was Adrianopolis. Hadrian was a lover of the fine arts (in the history of which, as well as of jurisprudence, his reign forms an important era), of poetry, philosophy, and rhetoric, all of which he attempted. He set a high value on Greek literature, and likewise on the cultus of Greece, and caused himself to be initiated into the Eleusinian mysteries.

HADRIAN, Wall of. See Roman Wall.

HADROSAURUS, *hăd-ro-saw'rŭs:* genus of gigantic extinct reptiles classed by Huxley in the order Dinosauria (q.v.). They belonged to mesozoic time, and were the American representatives of the European guanodon (q.v.), though somewhat smaller, probably abt. 30 ft. in length.

HADSCHY. See Hashish.

HAECKEL, *hĕk'ĕl*, Ernst Heinrich: German naturalist: b. Potsdam, 1834, Feb. 16. He studied natural science and medicine at Berlin and at Würzburg under Müller, Kölliker, and Virchow; and soon became distinguished for zeal, originality, and success in zoological studies. He became a docent at Jena 1861, extraordinary prof. 1862, an ordinary prof. 1865, a special chair of zoology being created for him. His lectures, which draw crowds of students to Jena Univ., extend over zoology, general and special; comparative anatomy; histology; embryology; and palæontology. His researches, founded on laborious investigation and collection of specimens, have concerned mainly the lower classes of marine animals. He has visited the North Sea shores, and the Mediterranean; been in Britain, Madeira, Teneriffe, the Canaries, Morocco, Granada; and 1881 sojourned in India and Ceylon, where he worked indefatigably on his favorite subjects, and others cognate. The fruits of his labors have appeared in numerous exhaustive

monographs in scientific magazines, like those on the *Siphonophora* (1869), and the *Monera* (1870), as well as in separate works. His first important publication was the magnificent work on the *Radiolaria* (1862), with an atlas of 35 plates; in this work he describes 144 new species besides reorganizing our knowledge of the group. *Die Kalkschwämme* (1866), treatise on the calcareous sponges, a landmark in the science of biology, attempts the analytical solution of the problem as to the nature of species. The *Natürliche Schöpfungsgeschichte* ('Natural History of Creation,' 1866, 10th ed., 1902) is a full statement of the theory of development. *Die Anthropogenie* (1874, 5th ed., 1893; also translated 'The Evolution of Man'), deals with the origin of man; but his most important work is *Die Generelle Morphologie der Organismen* (2 vols. 1866). Haeckel's other works include *Monographie der geryoniden oder Rüsselquallen* (1865); *Entwickelungs-geschichte der Siphonophoren* (1869); *Biologische Studien* (1870–74); *Arabische Korallen* (1876); *Freie Wissenschaft und freie Lehre* (1877; English trans. 'Freedom in Science and Teaching,' 1878); *Gesammelte populäre Vorträge* (2 vols., 1878–79; 2d ed. 1902); *Monographie der Medusen* (1879–81); *Die Naturanschauung von Darwin, Goethe, und Lamarck* (1882); *Indische Reisebriefe* ('A Visit to Ceylon' 1883); *Plankton-Studien* (1890); *Der Monismus* (1893); *Systematische Phylogenie* (1894-6); *Ursprung der Menschen* (1898, English trans. 'The Lost Link' 1899); *Kunst-Formen der Natur* (1899–1901–1904); *Welträthsel* (1899; English trans. 'The Riddle of the Universe,' 1900), of which over 120,000 copies have been sold; *Insulinde* (1901); *Lebenswunder* (English 'Wonder of Life,' 1904); *Entwickelungs-Gedanken* (1905); *Wanderbilder* (1905); etc. In these works and lectures Haeckel appears as a thorough-going supporter of the Darwinian development theory, though differing from Darwin in some details, and in some points extending his method and going beyond him. He has separated a large number of the lower organic forms into a kingdom by themselves, calling them *Protista*, and declining to rank them either as animals or vegetables. He affirms that there is no such thing as well-defined species in the dogmatic sense of the schools; and in such works as that on the Gastræa theory (1874), has sought to provide a phylogenetic classification of the animal kingdom, indicating the lines of descent and relationships of the various groups. He was the first outspoken adherent of Darwin in Germany, and has been an enthusiastic advocate of the same theory ever since; pressing it fully and openly from the realm of physical science into an extreme materialism in philosophy. See ZOOLOGY; SPECIES; DARWIN; DARWINIAN THEORY.

HÆMA- (used in compound words) [Gr. *haima*,

blood]. Many of these words have the alternative spelling HEMA-.

HÆMACHROME, n. *hē'mă-krōm* [Gr. *haima*, blood; *chrōmă*, color]: the coloring matter of the blood.

HÆMADROMOMETER, n. *hē'mă-drō-mŏm'ĕ-tėr* [Gr. *haima*, blood; *dromos*, a course; *metron*, a measure]: an instrument for measuring the velocity of the blood-stream.

HÆMADYNAMOMETER, n. *hē'mă-dĭn'ă-mŏm'ĕ-tėr* [Gr. *haima*, blood; *dunămis*, force *mĕtron*, a measure]: instrument devised by Poisseville for determining the pressure of the blood in the arteries and veins of the living body. The pressure is measured, as in the barometer, by the column of mercury that it balances. The oscillations of the mercury are inscribed in the form of an undulating curve on a cylinder made to revolve by clock-work; the height of the undulations denoting the variations in *pressure*, and their horizontal amplitude the *time*.

HÆMAGLOBIN. See HÆMOGLOBIN.

HÆMAL, a. *hē'măl* [Gr. *haima*, blood]: connected with blood-vessels, or with the circulatory system; applied to the arch on the ventral side of the vertebral column, which incloses and protects the heart and large blood-vessels.

HÆMAPOIESIS, n. *hē'mă-poy-ē'sĭs*, HÆMATOPOIESIS [Gr. *haima*, blood *poiēsis*, the making or forming of a thing]: the production or formation of blood. HÆMAPOIETIC, a. *hē'mă-poy-ĕt'ĭk* [Gr. *poiētĭkos*, making, effecting]: making or producing blood.

HÆMAPOPHYSES, n. *hē'mă-pŏf'ĭ-sēs* [Gr. *haima*, blood; *apoph'ysis*]: in *anat.*, the parts projecting from a vertebra which forms the hæmal arch.

HÆMASTATICS, *hē'ma-stăt'ĭks* or *hĕm-a-*, and HÆMADYNAMICS, *hē'ma-dī-năm'ĭks* or *hĕm-a:* statics (q.v.) and dynamics (q.v.) of the blood. See BLOOD; CIRCULATION OF THE BLOOD.

HÆMATACHOMETER, n. *hē'mă-tăk-ŏm'ĕ-tėr* [Gr. *haima*, blood; *tachus*, swift; *metron*, a measure]: an instrument for measuring the velocity of the blood stream.

HÆMATEMESIS, n. *hē'mă-tĕm'ĕ-sĭs* [Gr. *haima*, blood, *haimătos*, of blood; *ĕmĕō*, I vomit]: rejection of blood from the stomach (q.v.). Hæmatemesis is liable to be mistaken for hæmoptysis (q.v.), unless careful attention is given to the mode in which the blood is ejected. The blood in hæmatemesis is dark, sometimes nearly black; in hæmoptysis it is bright red (arterial blood) and often more or less frothy. The proper remedies are the liberal use of ice or of ice-cold water; acetate of lead, in doses of two to five grains; tannin, five to ten grains (it must not, however, be given with acetate of lead); oil of turpentine, six to ten drops repeated every hour or

two. The first and the last are perhaps the most effectual means, which can be used in combination. The turpentine may be given beaten up with the white of an egg. It must be discontinued when the symptoms of urinary irritation begin to appear.

HÆMATIN, or HÆMATINE, *n. hē′ma-tĭn*, or HÆMATOSINE, *hē-măt′o-sĭn* [Gr. *haima*, blood, *haimătŏs*, of blood]: a derivative of hæmoglobin (q.v.), and included in that substance, forming the red coloring matter of the blood of the higher animals. The probable formula is $C_{68}H_{70}N_8Fe_2O_{10}$. It may be best prepared by extracting blood clot, directly, with hot alcohol to which a small quantity of sulphuric acid has been added. The extract is next agitated with chloroform, which takes up the hæmatin. The chloroform is then separated, washed with water to remove the acid, and allowed to evaporate, when the hæmatin is deposited in the form of a bluish-black powder. Hæmatin is a very stable compound, and may be heated to 350° F. without decomposition. At higher temperatures it burns with evolution of hydrocyanic acid, leaving an ash composed chiefly of oxide of iron. It is insoluble in water, ether, dilute acids, and pure alcohol; but it dissolves readily in solutions of the caustic alkalies, and in alcohol to which a small quantity of sulphuric acid has been added. Its chief peculiarity is that it contains a comparatively large percentage of iron. HÆMATOIDIN, n. *hē′mă-tŏy′dĭn* [Gr. *eidos*, resemblance], the blood-crystals found as a pathological production in old extravasations of blood. HÆMATITIS, n. *he′mă-tī′tĭs*, inflammation of the blood. HÆMATINURIA, n. *hē′mă-tĭ-nū′rĭ-ă* [Gr. *ouron*, urine], a condition of the urine in which it contains hæmatin.

HÆMATINONE, n. *hē-măt′ĭn-ōn* [Gr. *haimatinos*, bloody]: a red glass known to the ancients, and used for mosaics, ornamental vases, etc.; it is mentioned by Pliny, and occurs frequently in the ruins of Pompeii. Its fine red color, intermediate between red and vermilion, is due to red oxide of copper, and is completely destroyed by fusion. Hæmatinone is opaque, harder than common glass, has a conchoidal fracture, and a sp. gr. of 3·5. It contains no tin and no coloring matter except cupreous oxide.

HÆMATITE, n. *hē′mă-tīt* [Gr. *haimatītĭs*, resembling blood—from *haima*, blood]: a sesquioxide of iron; mineral consisting of peroxide of iron, occurring often in large quantity; a valuable iron ore (see IRON). There are two principal varieties, *Red Hæmatite* and *Brown Hæmatite*. The red occurs frequently in globular and grape-like masses, with a radiating fibrous structure. It is sometimes of dull reddish-brown, sometimes of a brilliant bluish-gray color; the streak is blood-red. An earthy kind is called *Iron Froth*, and consists almost en-

tirely of peroxide of iron. Brown hæmatite contains about 14 per cent. of water. Its color is generally some shade of brown, sometimes almost black. Different shades of color are often presented in concentric wavy bands. The surface is often covered with a beautiful black varnish, sometimes iridescent. It is frequently found crystallized in rhombohedric, prismatic, or tabular crystals. The primary form is a right rhombic prism.

HÆMATOCELE, n. *hē′mă-tō-sēl* [Gr. *haima,* blood; *kēlē,* a tumor]: cystic tumor filled with blood, as distinguished from hydrocele, the contents of which are serous in character.

HÆMATOCONITE, n. *hē-ma-tŏk′on-īt* [prefix *hæmato-;* Gr. *konis,* dust]: in *mineral.,* variety of calcite colored blood-red, or brownish red, by red oxide of iron. It is the Rosso Antico of Italy. See ROSSO ANTICO.

HÆMATOCRYA, n. *hē′mă-tŏk′rĭ-ă* [Gr. *haima,* blood; *kruŏs,* cold]: a term applied to the cold-blooded vertebrate animals, as fishes and reptiles. HÆ′MATOCRY′AL, a. *-krī′ăl,* cold-blooded.

HÆMATOIDIN. See under HÆMATIN.

HÆMATOLOGY, n. *hē′mă-tŏl′ŏ-jĭ* [Gr. *haima,* blood; *logos,* discourse]: a description of the blood.

HÆMATOMA, n. *hē-mă-tō′mă,* HÆMATOMATA, n. plu. *hē′mă-tŏm′ă-tă* [Gr. *haima,* blood, *haimătos,* of blood]: a kind of tumor formed from an effused blood-mass resulting from a hemorrhage.

HÆMATOMETRA, n. *hē′mă-tō-mē′tră* [Gr. *haima,* blood, *haimătos,* of blood; *mētra,* womb]: an accumulation in the uterus of menstrual blood which becomes thick, black, and tarry, and often causes great dilatation.

HÆMATOPUS, n. *hē-măt′o-pŭs* [prefix *hæmato-;* Gr. *pous,* a foot]: in *ornith.,* typical genus of the sub-family *Hæmatopodinæ,* oyster-catchers, a sub-family of *Charadriidæ* (plovers).

HÆMATOSINE, n. *hē′mă-tō′sĭn:* same as *hæmatin* (q.v.).

HÆMATOSIS, n. *hē′mă-tō′sĭs* [Gr. *haima,* blood, *haimătŏs,* of blood]: the formation of blood.

HÆMATOTHERMA, n. *hē′mă-tō-thĕr′mă* [Gr. *haima,* blood; *thĕrmŏs,* warm]: a term applied to the warm blooded vertebrate animals.

HÆMATOXYLON, n. *hē′mă-tŏks-ĭ-lŏn* [Gr. *haima,* blood; *xulon,* wood]: the logwood-tree; the *Hæmătŏxylŏn Campēchĭānŭm,* Ord. *Legūmĭnōsæ.* HÆ′MATOX′YLIN (or -LINE), n. *-lĭn,* the coloring principle of logwood. It is a chromogen (a term used by chemists to denote some nearly or quite colorless substances which, under certain influences, yield well-marked colors) obtained from logwood (*Hæmatoxylon Campeachianum*). The formula is $C_{16}H_{14}O_6$; combined with three molecules of water it

forms dimetric, with one of water trimetric crystals. The crystals are large, transparent, and brilliant, and have a sweet taste. Hæmatoxylin dissolves sparingly in water, but it is taken up very freely by solution of borax, by hypo-sulphite of sodium, phosphate of sodium, and some other salts. It is also soluble in ether and in alcohol. Hæmatoxylin is obtained by mixing powdered extract of logwood with quartzose sand (to prevent its agglomeration into lumps), and digesting this powder for several days with about six times its volume of ether. The liquid is then distilled till the residue assumes the consistence of a syrup. If this residue is mixed with water, crystals of hæmatoxylin are in a few days deposited, which on an average weigh about one-eighth of the extract that was employed.—The color reactions of this substance with metallic compounds are peculiar, and in consequence of the tinctorial power of some of them, deserve a brief notice. Solution of acetate of lead gives with one of hæmatoxylin a white precipitate, which speedily becomes blue; salts of copper give a dirty green precipitate, which also soon becomes blue; chloride of barium produces a red precipitate; protochloride of tin gives a rose-colored, and iron alum, a scanty blackish precipitate. The purple color which the solution of hæmatoxylin assumes if oxygen and ammonia are present, is due to a decomposition, of which a substance termed *hæmatein* ($C_{16}H_{10}O_5$) is one of the products; the compound resulting from the union of hæmatein and ammonia possessing this tint. The solution of hæmatein-ammonia (or hæmateate of ammonia, as some chemists have termed it) yields colored precipitates with many metallic salts; with acetate of lead, it gives a deep blue, with sulphate of copper, a violet blue, with protochloride of tin, a violet, and with iron alum, a black precipitate. It is upon the various reactions above described that the value of logwood as a dye depends.

HÆMATOZOA, *hē-ma-to-zō′a* or *hĕm-a-to-zŏ′a* [Gr. *haima*, blood, and *zoön*, a living creature]: term applied by helminthologists to the entozoa existing in the blood. They occur in mammals, birds, reptiles, fishes, and many invertebrate animals. Some belong to the Nematoidea, others to the Trematoidea, and others to the Protozoa. Most of them are microscopic, devoid of generative organs, and exist in the blood, circulating both in the arteries and in the veins. A very small number attain a considerable size, and are provided with organs of reproduction. These larger ones are generally found in some definite part of the circulating system. Thus, for example, in man the *Distoma hæmatobium* is almost entirely restricted to the abdominal venous system; in the horse, the *Sclerostoma aneurysmaticum* to the abdominal arterial system; and in the porpoise, the *Pseudalius filum* to the pulmonary artery and its branches.

Nothing definite is known regarding the origin of these

parasites, but certain observations made upon the Hæmatozoa of the frog by Valentin (and subsequently confirmed by Vulpian), lead to the belief, that some of the more minute forms are the larvæ of a worm living in the organs surrounding the vessels. We shall restrict our remarks to the Hæmatozoa occurring in man, the horse, and the dog. By far the most important of human Hæmatozoa is the *Distoma hœmatobium* already mentioned. It has been observed only in Egypt, where it is very common, and where it was found by Griesinger 117 times in 363 autopsies. The male, which is the larger of the two, is about $\frac{3}{10}$ ths of an inch long The common Liver Fluke (*D. hepaticum*) has, in one instance at least, been found in the interior of the portal vein. In the various cases in which distomata have occurred in tumors, they must have been conveyed to the places in which they were found by the blood.

In 1665, Ruysch discovered a large number of small worms in a dilatation of the mesenteric artery of a horse. Sixty years afterward, a second case was noticed, and it is now known that such cases are of extreme frequency. These verminous aneurisms of the abdominal arteries occur in the ass and in the mule, as well as in the horse. The worm found in them is the *Sclerostoma armatum*, one of the Nematoidea, and often more than an inch in length. It is old horses that are chiefly affected; indeed they scarcely ever seem to escape, for Rayer found these tumors 48 times in the examination of 50 worn-out horses. For much very interesting information on this curious subject, the reader is referred to Rayer's Memoir in the *Archiv. de Médeeine comparée* for 1842.

In the dog, Hæmatozoa sufficiently large to be visible to the naked eye are rare. Thirteen such cases are collected by Davaine in his *Traité des Entozoaires*, 1860, the worm generally being a filaria. The microscopic larvæ of a nematoid worm are sometimes found in enormous quantities circulating in the blood of this animal. From the examination of the blood of 480 dogs, Gruby and Delafond believe that 1 in every 20 of these animals presents this peculiarity.

In none of the above cases does the presence of these entozoa appear to affect the general health of the individual in whom they reside, whether he be man, horse or dog. See ENTOZOA; NEMATOIDEA; TREMATODA; etc.

HÆMATURIA, n. *hē'mă-tū'rĭ-ă* [Gr. *haima*, blood; *ouron*, urine]: discharge of blood with the urine, usually from disease of the kidneys or bladder. It is rather a symptom than a disease, and takes its character from the associated morbid conditions of the parts concerned. It is a symptom always of some gravity, but not very often directly fatal.

HÆMIN, n. *hē'mĭn* [Gr. *haima*, blood]: a crystalline derivative from hæmoglobin, which forms a most delicate medico-legal test of the presence of blood; also called *hydrochlorate of hæmatin*.

HÆMODORACEÆ, *hē-mo-do-rā'sē-ē* or *hĕm-o-do-rā'sē-ē:* natural order of endogenous plants, consisting of herbaceous plants with fibrous roots, and sword-shaped leaves; differing from *Iridaceæ* in habit, and in having the stamens six in number, or if only three, opposite to the petals. There are about 50 known species, chiefly natives of N. and S. America, s. Africa, the Mascarene Islands, and New Holland. Some have beautiful flowers. A red color exists in the roots of some: hence the name BLOOD-ROOT has been given to them. In this order are ranked the *Vellozias* or Tree Lilies.

HÆMOGLOBIN, *hē-mō-glō'bĭn* [Gr. *haima*, blood; L. *glŏbŭs*, a ball]: an organic coloring matter, which constitutes about nine-tenths of the weight of dried red blood corpuscles, and serves as a carrier of oxygen from the lungs to the general tissues of the body. It is an exceedingly complex substance, and its formula is not certainly known. According to many authorities, Hæmoglobin is not a definite chemical compound, but a more or less variable mixture of simpler substances. It gives all the general reactions of the proteids, but, unlike most of the proteids, it may easily be obtained in crystalline form, its crystals commonly occurring in rhombic plates or prisms, varying somewhat in shape, according to the source from which the substance is prepared. The physiological importance of Hæmoglobin depends upon the fact that it readily combines with oxygen to form a very unstable compound known as oxyhæmoglobin. The combination takes place as the blood corpuscles containing the Hæmoglobin pass through the lungs; and the loosely-combined oxygen is given off again as the corpuscles pass through the capillaries, the oxyhæmoglobin being thereby again reduced to Hæmoglobin. The preparation of pure Hæmoglobin is a difficult operation. One of the best methods that have been proposed consists in adding to defibrinated blood about one-sixteenth of its own volume of ether, and shaking the mixture. This treatment causes the red corpuscles to break up, and the fluid becomes lake-colored. After a time, varying from a few minutes to three days, according to the source of the blood, a heavy deposit of minute crystals of oxyhæmoglobin is thrown down. This may be purified by washing with 25 per cent alcohol, and subsequent recrystallization. Crystals of Hæmoglobin itself have also been prepared. Pure Hæmoglobin has a purplish color, which gradually passes into a scarlet or a yellowish red, as the substance absorbs oxygen and becomes thereby converted into oxyhæmoglobin. When oxyhæmoglobin is acted upon by acids or alkalies, or by the gastric juice, it is resolved into a proteid substance and hæmatin (q.v.).

HÆMOPHILIA, n. *hē'mŏ-fil'ĭ-a* [prefix *hæmo-*; Gr. *philia*, love, affection]: in *pathol.*, hemorrhagic diathesis, characterized by an excessive tendency to spontaneous

bleedings of various parts from very slight, inappreciable causes, with excess of red corpuscles and great diminution of fibrin.

HÆMOPTYSIS, n. *hē-mŏp'tĭ-sĭs* [Gr. *haima*, blood; *ptŭō*, I spit]: expectoration of blood, a very significant and often dangerous symptom of disease of the lungs or heart; in all cases important, and requiring immediate attention, yet apt to be viewed popularly with somewhat exaggerated alarm. It is seldom directly fatal. It is rather as an indication of dangerous disease, than because of its immediate danger, that it requires such careful attention; but the gravity of the symptom depends very much on its cause. It is important to remember that spitting of blood in itself is of little importance, for the blood may come from any part of the mouth or from the nose. In all such cases a careful examination should be made to determine the source of the bleeding. The treatment should not be undertaken without a medical examination; but in case of extremity repeated doses of ipecacuanha carried up even to the emetic effect, have often been found serviceable.

HÆMORRHAGE, or HEMORRHAGE, n. *hĕm'ŏr-rāj'* [Gr. *haimorrha'gĭă*, a flowing of blood—from *haima*, blood; *rhegnūmĭ*, I burst forth]: escape of blood from the arteries or veins (see BLEEDING). HÆMORRHAGIC, or HEMORRHAGIC, a. *hĕm'ŏr-rā'jĭk*, pertaining to or consisting in hæmorrhage. HÆM'ORRHOIDS, or HEMORRHOIDS, n. plu. *-royds* [Gr. *rhĕō*, I flow; *eidos*, appearance]: piles; called in Scripture, *emerods*. See PILES. HÆM'ORRHOI'DAL, or HEMORRHOIDAL, a. *-roy'dăl*, pertaining to.

Note.—All the above words, and others, from *haima*, blood, are oftener spelled with *e* than *æ*.

HÆMOSPASTIC, a. *hē-mo-spăs'tĭk* [prefix *hæmo-*; Gr. *spastikos*, stretching, drawing—from *spaō*, I draw]: in *surg.* and *med.*, drawing blood; used of any therapeutic agent for producing an efflux of blood.

HÆMOSTASIA, n. *hē'mo-stā'zĭ-a*, HÆMOSTASIS [Gr. *haimostasis*, means of stopping blood]: in *pathol.*, stagnation of blood arising from plethora.

HÆMOTHORAX, n. *hē'mō-thō'răks* [Gr. *haima*, blood; *thōrax*, the trunk of the body]: an effusion of blood, or of a fluid of a sanguineous character, in the cavity of the chest.

HAFF, *hâf:* word obsolete in current German, signifies, in Danish, the sea, or a considerable portion of the sea. In German it occurs only as the proper name of three estuaries of peculiar form on the southern coast of the Baltic—viz., the Stettin Haff (q.v.), the Frisches Haff (q.v.), and the Kurisches Haff (q.v.). Haff-fishing is a term used by the inhabitants of Shetland to signify sea-fishing.

HAFFLIN, a. n. *hăf'lĭn:* in *Scot.*, half-grown; a lad.

HAFIZ.

HAFIZ, *hâ'fîz* (one who knows the Koran and the Traditions by heart); 'nom de plume' of MOHAMMED, SHAMS-AD-DIN (Sun of Religion), called also LISHAN-AL-GHAID (Voice of Mystery): eminent Persian theologian, philosopher and grammarian, and one of the greatest poetical geniuses of all times: b. at Shiraz, beginning of the 14th c.; d. 1388 (A H. 791). He early applied himself to science and learning. His proficiency in various branches of knowledge brought him under the notice of the then reigning House of Muzaffer, and he was not only appointed teacher in the royal family, but a special college was founded for him. His spirit of independence, however, stood in the way of his worldly advancement, and notwithstanding many offers of princely favor, he remained during his whole life in the humble condition of a dervish. The burden of his poetical compositions is for the most part wine, love, nightingales, flowers—in fact, beauty in every form; occasionally also the praise of Allah and the Prophet, and reflections on the instability of life and its joys; through all of them there runs, however, a withering contempt of all professional piety, of mock-humility, and of sanctified abhorrence of the good things of this world. These poems are of such exquisite sweetness, that the poet has received the name *Tschegerleb* (Sugarlip); and his contemporaries speak of his having drunk from the fountain of life, a draught of which was brought to him, in reward for his untiring perseverance in study, and his power of self-abnegation, by Zikhr (the Mohammedan Elijah) himself. No less remarkable are the sudden and striking transitions in his writings, and his readiness of wit on several noticeable occasions.

Hafiz was married, and appears to have reached a happy old age. The enmity, however, which had been provoked in the breasts of the zealous defenders of religion by the freedom of his manners, and his more than Sufistic contempt for the outward forms of Mohammedan piety, broke out undisguisedly at his death. The ministers of religion refused to repeat the usual prayers over the dead body, and after long altercations between the members of his family and his enemies, it was agreed that the question, according to the usual custom of the East, should be decided by lot. The result was favorable; whereupon he was buried with great honor. His tomb, about two m. n.e. of Shiraz, has been adorned with the greatest sumptuousness by princes and nobles, and is still resorted to by pilgrims from all parts of Persia. It has been visited and described by Kæmpfer, Pietro della Valle, Chardin, Le Bruyn, Scott Waring, W. Franklin, Ouseley, and others.

How far some of the odes of Hafiz are *bonâ fide* productions of a most licentious nature, or are intended as an allegorical and mystical revelation of things divine in the manner of Sufism (q.v.), as is declared by Hafiz's

pious admirers, is a question which has at different times been raised before ecclesiastical and critical courts. A style brilliant, yet clear—imagery gorgeous, yet clothed in pure and unaffected diction—undulating melody and classical harmony, are the chief characteristics of Hafiz's anacreontic lyrics, which have not only become the national poetry of his country, but are even appealed to as an oracle on most important questions of peace and war. The number of their commentators is legion: the most valuable notes, however, are those of Shemii, Sururi, Sudi. The *Divan* was collected first by Said Kasim Anvari, after the death of the poet. Lithographed and printed editions of Hafiz have been published at Calcutta (1790, 1826), at Bombay (1828–50), at Cawnpore (1831), Bulak (1834–40), Constantinople (1841), etc. A very valuable edition by H. Brockhaus was published at Leipsic 1854–61. Of translations in European tongues, are those of Rewitzki in Latin (Vienna 1771); Richardson, Jones, Ouseley, Hindley, Rousseau, Bicknell (1876) in English; and by Hammer-Purgstall and Daumer, in German.

HAFT, n. *hăft* [AS. *hæft*, a handle: Icel. *hefta;* Dan. *hefte*, to fetter, to bind: Ger. *haft*, a clasp—*lit.*, the part which is seized]: that part of a cutting instrument by which it is held and used; a handle: V. to set in a handle. HAF'TING, imp. HAFTED, pp. *hăf'tĕd.*

HAG, n. *hăg* [AS. *hæges;* Ger. *hexe;* mid. H. Ger. *hacke*, a witch: connected with HAGGARD]: a fury; an ugly old woman; a witch; an eel-like fish; one of the lamprey family. HAGGED, a. *hăg'ĕd*, ugly; like a hag. HAG'GISH, a. *-gĭsh*, of the nature of a hag; having a horrid, deformed appearance; ugly. HAG'GISHLY, ad. *-lĭ.* HAG-LIKE, like a hag.

HAG, n. *hăg* [Ger. *hag*, a fence, a hedge, an inclosure: Dut. *haag*, a hedge]: a quagmire, as a moss-hag. HAGGARD, n. *hăg'gĕrd*, in *prov. Eng.*, a straw-yard; a farmyard; a cart-shed; an inclosure. See HAGGARD.

HAG, *hăg* (*Myxine* or *Gastrobranchus*): genus of cartilaginous fishes, allied to lampreys, and with them ranked among Dermopterous Fishes by Owen. The fishes of this genus are of low organization, and seem to connect fishes with cephalopodous mollusks. The vertebral column is reduced to a mere flexible cartilaginous tube, nor are there any other bones. The shape resembles that of an eel or worm. The mouth is formed by a mere membranous ring, with a single tooth on its upper part, while the tongue is furnished with two rows of strong teeth, and also performs the office of a piston in the use of the mouth as a sucker. There are no eyes. There are six gill-bags on each side, receiving streams of water from the gullet (*œsophagus*) by as many tubes. The tail is surrounded by a narrow fin. The skin is smooth and very unctuous. The hag also makes its way into fishes.

through their skin, and is therefore sometimes called the *Borer*.

HAGAR, *hā'găr*, (*LXX. Agar*): Egyptian bondwoman of Sarah, Gen. xvi. This her semitic name (the Egyptian is unknown) has been derived from various roots, and has been translated accordingly—'slender,' 'stranger,' and 'flight' (in allusion to her after-life). Sarah having remained barren up to a very advanced age, at last gave H. to Abraham, ten years after his sojourn in Canaan, as a concubine—according to the Eastern custom—in the hope of through her establishing a family which she could call her own. H. bore Abraham a son, whom he called Ishmael [God has heard], and in whom he for a time saw the future father of the progeny promised him. But 16 years later, and when Abraham was (we are told) a hundred years old, Sarah herself bore Isaac; and we find it significantly repeated nine times in seven verses (Gen. xxi. 2-9) that Abraham and Sarah were his parents—in repudiation, according to rabbinical authorities, of certain rumors about Isaac's illegitimacy, spread by Hagar. At last the domestic contentions that naturally arose led Abraham, though reluctantly, to cast out H. together with Ishmael. How the two fugitives lost their way in the desert of Beersheba; how the water in the bottle being spent, the broken-hearted mother set herself at a distance from her child, in order that she might not see his death; how her weeping and the loud voice of the boy were answered by an angel, who pointed out a well (Temzem, in the inclosure of Mecca)—all this forms one of the most touching and well known narratives of the Bible.

HAGAR, *hā'găr*, George Jotham: encyclopedist and author: b. Newark, N. J., 1847, Sept. 12. He attended the public schools of his native place, and afterward became a stenographer. During the Civil war he was a member of the Auxiliary Relief Corps of the U. S. Sanitary Commission, and after the close of hostilities he became news editor of Frank Leslie's *Illustrated Newspaper*, retaining that position until 1882; he was associate editor of the *Columbian Encyclopedia* in 1888-93; a contributor to *Appleton's Cyclopedia of American Biography* and *Appleton's Annual Cyclopedia*, 1886-1902; and one of the revisers of the *Columbian*, the *People's*, the *International*, the *New Standard*, the *Imperial*, and *Johnson's* encyclopedias. During 1897-98 he compiled an Appendix to the *Encyclopedia Britannica*, and in 1900-1902 was editor of the encyclopedia section of the *Anglo-American Encyclopedia and Dictionary*, and the reviser of *Harper's Encyclopedia of United States History*. In 1885 he compiled, *What the World Believes* (republished ten years later under the title of *Bibles and Beliefs of Mankind*); he also compiled the greater part of the *History of the United States in Chronological Order* (1886), and (with B. J. Lossing), *Our Great Continent* (1889).

HAGENAU, *hâ'ghĕh-now*, or HAGUENAU, *hâg-nō'* or *âg-nō'*: town of the German empire, province of Alsace-Lorraine, ceded by the French in the war of 1870-1; on the Moder, 18 m. n.n.e. of Strasburg. It was founded 1164 by Frederick Barbarossa, and, as it was intended for the reception of the imperial insignia, it was strongly fortified. It successfully withstood many sieges, especially during the thirty years' war; but on its occupation 1675 by the imperialists, its fortifications were destroyed. Bloody battles took place here between the French and Austrians 1793, Oct. 17, and Dec. 22. Pop. 14,752.

HAGENBACH, *hâ'gĕn-bâĕh*, KARL RUDOLF: German theologian: 1801, Mar. 4—1874, June 7; b. Basel, where his father was prof. of anatomy and botany. While at the universities of Bonn and Berlin he became acquainted with the direction given to theology by Schliermacher; and on his return to Basel, he received, from his intercourse with De Wette, a fresh theological development. After being an extraordinary prof. he became ordinary prof. of theology 1828, and honorary doctor of theology 1830. He delivered to public audiences, and afterward published several courses of lectures on the Nature and History of the Reformation (*Wesen u. Gesch. d. Reformation*, 6 vols. 1834-43; 2d ed. 1851-56), on the Early History of the Church (*Aeltere Kirchengesch.*, 2d ed. 1857-63), and on the Church History of the 18th and 19th Centuries (*Kirchengeseh. d.* 18 *u.* 19 *Jahrh.*, 2 vols. 3d ed. 1856, translated into English). His tabular view of the History of Dogmas (1828), and his compend of the same department of historical theology (*Lehrbuch d. Dogmengesch.*, 2 vols. 4th ed. 1857, translated into English), are highly praised. His *Encyklopädie u. Methodologie d. Theologischen Wissenschaften* is one of the most useful manuals of German theology. A History of Evangelical Protestantism, several vols. of Sermons, a Memorial of De Wette, and a work on Religious Education in the Gymnasia, have come from his pen; also two small vols. of poetry, and a collection of poems entitled *Luther u. Seine Zeit*.

HAGERSTOWN, *hā'gĕrz-town*, Maryland, cap. of Washington co., on Antietam creek, and the Baltimore & Ohio, the Cumberland Valley, the Norfolk & Western, and the Western Maryland railroads. It was settled about 1740, and figured prominently as a base of supplies during the war between the States. It is the seat of Kee Mar College for women, Baeon's School for girls and boys, and the Washington Co. Free Library is located here. There are extensive manufactories of knit goods, bicycles, machinery, steam engines, lumber, etc., and the city is an important trade centre for western Maryland. It has electric street railways and lights, a high school, 3 national banks, and an assessed valuation of $7,000,000. Pop. (1905) about 14,000.

HAGGADA, *hăg-gâ'da* [Heb. from *nagad, hagged,* to say, relate]: free, rabbinical interpretation of Scripture, chiefly for homiletical purposes. As its name signifies, H. was something 'said' (not 'received,' like the authoritative Halacha, q.v.). legend, saga, tale, gnome, parable, allegory; in fact, poetry springing up from the sacred soil, wild, luxuriant, and entangled like a primeval forest. It had three principal directions—the *Peshat* or hermeneutical investigation, *Derush* or practical application, and *Lod* or mystical illustrations. Zunz's minute divisions are: 1. Targumim; 2. Haggadistic elements in Halacha; 3. Ethical H.; 4. Historical H.; 5. Secret esoteric doctrine; 6. Special H. It flowed in an uninterrupted stream for more than a thousand years—from the Babylonian exile to the 10th c.—and its innumerable authors are either entirely anonymous or at best pseudonymous. It grew into immense dimensions, as, although orally delivered, parts were gradually added as marginal notes or glosses to Bible MSS., or were committed to writing as independent collections. These either followed the order of the scripture and were called after the special biblical book around which they had woven their fabric, or they were arranged and called after the Sabbatical and festive pericopes on which they treated. The most extensive collections, originally composed of single fragments which have survived are: Midrash Rabboth (commenced about A.D. 700 concluded about 1100), comprising the Pentateuch and the five Megilloth; and the Pesikta (about 700), which contains the most complete cycle of pericopes. Strangely, this latter itself had, through the many extracts made from it at an early period (Jalkut, Pesikta, Rabbathi, Sutarta, etc.), fallen into oblivion since the 15th c., until Zunz, in *Die Gottesdienstl. Vorträge der Juden* (Berlin 1832), not only proved its existence by evidence, but even restored it out of these fragments and parallel passages; and about the same time, the old MS. which agreed with Zunz's statements to the minutest details, was found by Steinschneider at Oxford.

For the general form of H. its language, its sources, and its development, no less than its vast influence on Christianity and Mohammedanism, and its immense usefulness for historical and theological investigations, see MIDRASH: TALMUD.

Haggada shel Pesach is the name of a ritual, partly in Hebrew, partly in Chaldee, used on the first two evenings of the Passover; which contains, besides a brief description of the exodus, extracts from the Scripture, the Mishna, Tosephta, Mechiltha, Sifri, and the two Talmuds, and some liturgical pieces. Originally, within a very small compass, it has been extended to its present larger size through centuries. Two 'Piutim,' or religious poems, were added in the 11th c., and four more Hebrew and Chaldee songs (the last originally a German *Volkslied*) as late as the 14th century.

HAGGAI, *hăg'gaī* (*Aggæus, Haggæus*): tenth of the 12 minor prophets of Israel, and the first of those who prophesied, in Palestine after the Babylonian captivity. Of his

own history, nothing positive is known. It is related that he was born in Babylon, of priestly lineage, and came to Jerusalem at a very early age. The Church Fathers suppose him to have been one of the exiles who had returned with Zerubbabel and Joshua; and Ewald infers from ii. 3, that he was one of the few who had seen the first temple, in which case he must have been a very old man when he composed his book. The time of his prophecies, however, is known with accuracy to fall in the 6th, 7th, or 8th month of the second year of Darius Hystaspis (cf. Ezra, v. 1; vi. 14; Haggai, iv. 24) = B. C. 520. Fifteen years had then elapsed since the foundations of the new temple had been laid; but during the reign of Cambyses and Pseudo-Smerdis, the work had been neglected, and even the most zealous men began to think that the time of the re-establishment of the sanctuary was not yet at hand. Suddenly, H. presented himself before Zerubbabel and Joshua the high priest, and strongly urged the re-establishment of the sanctuary, pointing at the same time to the famine in the land, as the divine punishment for the culpable neglect of the people, who thought only of their own houses, and not of that of God. His words made a deep impression, and the building was recommenced (i). The second discourse of the prophet—about a month later—predicts a still greater glory to the new temple than had belonged to the former—(ii. 3–9). Two months afterward he had to renew his reproaches against their inertness, and his promises of a blessed future (ii. 10–19). The fourth prophecy (ii. 20–23), delivered on the same day, is directed to Zerubbabel, and foretells great revolutions and political changes; but he, Zerubbabel, shall remain a 'signet' in the hands of God—i.e., the Jews and their princely leaders would not be harmed.

The style of H. is prosaic, and labors under an unusual tameness and poverty of expression, apparent principally in the frequent repetition, within the short space of two chapters, of certain words and phrases, which could scarcely have been retained for ornamentation (Eichh. Einl. s. 599). There is hardly any parallelism; but the prophet has endeavored to impart a certain vivacity to his writing by means of interrogation. The diction itself is generally pure and clear. H.'s name appears joined to that of Zachariah in some of the inscriptions of the psalms (cxxvii. and cxlv.—cxlviii., in Septuagint; cxxv., cxxvi., cxlv.—cxlviii., in Peshito, cxi. and cxlv., in Vulgate), a fact which points to the existence of an old tradition about these prophets having striven for the re-establishment of the music and singing of the psalms in the temple. Some critics suppose the present book of Haggai to be simply an epitome of some larger book, or a condensation of H.'s orally delivered prophecies. If so, they have certainly not gained in strength by such compression.

HAGGARD, a. *hăg'gĕrd* [F. *hagard*, wild, strange—from mid. L. *haga*, a hedge—from Ger. *hag*, a wood, a thicket, and the postfix *ard:* applied formerly to the wild hedge or wood birds, then to the gaunt appearance of ill-kept hedges

in the dark]: wild and rough in appearance; having sunken eyes; gaunt or lean: N. anything wild or irreclaimable; a wild or unreclaimed hawk. HAG'GARDLY, ad. *-lĭ*. HAG, n. *hăg*, or HAG'GER, n. *-ger*, in *Scot.*, a person employed in felling timber; the smaller branches of felled timber used as firewood.

HAGGARD. See under HAG.

HAGGARD, *hăg'ârd*, HENRY RIDER: novelist: b. Norfolk, Eng. 1856, June 22. He attended Ipswich grammar school; went to Natal, Africa, as sec. to Sir Henry Butler, 1874; became master of the high court in the Transvaal; read aloud in the volksrad the proclamation declaring the Transvaal British territory; returned to England 1879; was called to the bar in London; and visited the U. S. 1890–91. After the publication of *Cetewayo and His White Neighbors* (1882), his first novel, *Dawn* (1884), came out, followed by *The Witch's Head* (1885). Till this time his stories had not attracted much attention, but now succeeded two novels, *King Solomon's Mines* (1886) and *She* (1887), which placed him among the most popular sensational writers of the day. Others of his novels are: *Jess* (1887); *Allan Quatermain* (1888); *Cleopatra* (1889); *Beatrice* (1890); *Erie Brighteyes* (1891); *Nada, the Lily* (1892); *Montezuma's Daughter* (1894); *Dr. Thorne* (1898); *History of the Transvaal* (1900); *Black Heart and White Heart* (1900); *Lysbeth* (1901); *A Winter Pilgrimage* (1901); *Rural England* (1902); *Pearl-Maiden* (1903); *Stella Fregelius* (1903); *The Brethren* (1904); *A Gardener's Year* (1905); *Ayesha, or the Return of She* (1905); *The Poor and the Land* (1905); etc.

HAGGIS, n. *hăg'gĭs* [Scot. *haggis;* F. *hachis*, a hash]: Scotch dish, called by Burns the 'great chieftain o' the puddin' race.' It is made usually with the large stomach-bag of a sheep, one of the smaller bags, called the king's hood, together with the lights, the liver, and the heart. After the stomach-bags have been well cleansed, the small bag is boiled with the pluck. A quarter of the liver is now grated down, the heart, lights and small bags are minced very fine with half a pound of beef-suet. Two small teacupfuls of oatmeal previously browned before the fire, are added, with salt, black and Jamaica pepper, and half a pint of the liquor in which the pluck was boiled; sometimes a little minced tripe is added. The whole is now stirred together, put in the large bag, which is sewed up, and afterward boiled for about three hours.

HAGGLE, v. *hăg'l* [Swiss, *haggln*, to wrangle: prov. Dan. *hagga*, to hew, to hack; *hakka*, to peck, to keep finding fault with: Scot. *hogglin*, unsteady]: to haek or dispute; to be difficult in bargaining; to stick at small matters. HAGGLING, imp. *hăg'lĭng*. HAGGLED, pp. *hăg'ld*. HAG'GLER, n. *-lẽr*, one who. TO KEEP AGGING AT ONE, in *OE.*, to tease or provoke one much. See AGG.

HAGIOGRAPHA, n. *hăg'ĭ-ŏg'ră-fă*, or HAG'IOG'RAPHY, n. *-fĭ* [Gr. *hăgĭŏs*, holy; *graphō*, I write]: a certain division of the Old Testament Scriptures, comprising Chronicles, Nehemiah, Ezra, Esther, Job, Psalms, Proverbs, Ecclesiastes, Canticles, and Daniel; the sacred writings; the holy Scriptures. HAG'IOG'RAPHAL, a. *-ră-făl*, pertaining to the sacred writings. HAG'IOG'RAPHER, n. *-ră-fẽr*, one of the writers of the Hagiographa: see BIBLE.

HAGIOLOGIST, n. *hăg'ĭ-ŏl'ŏ-jĭst* [Gr. *hăgĭŏs*, holy; *logos*, a word]: one who writes or treats of the sacred writings. HAG'IOL'OGY, n. *-ŏ-jĭ*, the history of saints.

HAGUE, or THE HAGUE, *hāg* (Dutch, *'s Gravenhage*; Fr. *La Haye*): city of S. Holland, cap. of the Netherlands, and residence of queen; pleasantly situated and well-built, half Dutch, half French in appearance. Pop. (1900) 199,285. It is intersected in all directions by canals, and shady avenues of linden-trees, and abounds in palaces, public buildings and stately houses. It has the royal library of 500.000 vols. and fine galleries of paintings, the choicest of which, containing some of the most precious specimens of the Dutch school, is in the palace of the king. The town contains numerous churches, the most notable of which is the Great Church, founded 1308, distinguished for its lofty hexagonal tower with a *carillon* of 38 balls. The Hague is the seat of both chambers of the states-general, and of various tribunals and public offices, in one of which are deposited the archives and state papers, preserved by the republican and regal governments of the country for 400 years. In a historical view, the most interesting buildings of the Hague are the Gevangenpoort, or the prison gate-house, in which Oldenbarnevelt, the brothers De Witt, and many others distinguished in the history of Holland, have at different periods been confined; the Binnenhof, in which the former of these patriots was put to death, and which, together with the Buitenhof, forms an irregular mass of public buildings of various ages, enclosed by moats, and approached by drawbridges. Besides the palace of the king, there are, within the city, several others occupied by members of the royal family, or with various national collections of interest, the most notable of which is the Mauritz Huis, containing a splendid collection of pictures by the Dutch masters. The palace called 't Huis in 't Bosch (The House in the Wood), on the outskirts of the town, in the midst of a noble wood, is notable specially for the tapestry, and the frescoes and other paintings which it contains by Rubens, who, in conjunction with several of his most distinguished pupils, painted the ceiling and walls of several apartments. The Hague is essentially a city of fashion, and its prosperity depends chiefly on the court and nobility. The trade consists principally of book-printing, lithographing, metal-founding, carriage-building, beer-brewing, distilling gin, cabinet-work, rope-

1. Le Lange Pooten.
2. Le Vivier.

spinning, making leather, etc.; and the natives of the port (Scheveningen) gain a livelihood by fishing. In the neighborhood are many handsome country-seats; and not far off is Ryswick, where the treaty of peace was signed 1697. Scheveningen is a favorite bathing-place on the sea-coast, with which the Hague is connected by a broad causeway, bordered with rows of trees. The origin of the Hague is very ancient, and as far back as 1250, William, Duke of Holland and Emperor of Germany, erected a hunting-seat there, on the site of an older residence of his predecessors. In the 16th c. it was the seat of govt. of the states-general; and in the next century it became the birthplace of many distinguished members of the House of Orange, among them William III. of England; while, as the residence of the stadtholders, it was naturally the centre of the numerous important negotiations of European diplomacy, with which they were associated. The Hague is connected by a railway with Amsterdam, 36 m. n., and Rotterdam, 13 m. south.

HAGUE PEACE CONFERENCE, a conference of the chief political powers of the world, held in the 'House of the Woods,' at The Hague, in May, June, and July, 1899, in response to an invitation of the Czar Nicholas II. of Russia, issued in August of the previous year. The Emperor's rescript laid special emphasis on 'the terrible and increasing burden of European armaments,' and recommended for careful consideration the questions of 'the maintenance of general peace, and a possible reduction of armaments.' The conference did not achieve all the results sought, but it accomplished much looking toward international arbitration and opened the way for the eventual attainment of universal peace. Three conventions were adopted as a result of the conference: first, the pacific settlement of international disputes; second, concerning the laws and customs of war on land; and third, the adaptation to naval warfare of the principles of the Geneva Convention of 1864. The conference also declared against the throwing of projectiles and explosives from balloons, against the use of projectiles intended solely to diffuse deleterious gases, and against the use of expanding bullets. Under the first convention a permanent court of arbitration was established at The Hague, open under prescribed conditions to non-signatory powers as well as those which had participated. The conventions were ratified by Austria-Hungary, Belgium, Bulgaria, Denmark, France, Germany, Italy, the Netherlands, Persia, Roumania, Russia, Siam, and Spain. The U. S. was represented at the conference by Andrew D. White, Seth Low, Stanford Newell, Capt. Mahan, and Gen. Crozier, and they were instructed by Sec. Hay to support every proposition for the amelioration of war conditions, and the employment of arbitration to settle disputes between

nations; but to advise against the reduction of armies and the discouragement of new inventions in firearms and explosives, as these agencies had a tendency to prevent rather than provoke war.

On Oct. 30, 1904, President Roosevelt, in compliance with a memorial of the Interparliamentary Union in behalf of general arbitration, addressed a note to the signatory powers of the first Conference, inviting representatives to a second one. But the meeting was postponed until the conclusion of the war between Russia and Japan, when, as a compliment to the originator of the plan, the President yielded the initiative in convoking the second conference to the Czar. This conference was held at The Hague in 1907. Its final act was recorded in the minutes as follows:

The Second International Peace Conference, first proposed by the President of the United States, having been, through the invitation of his Majesty the Emperor of all the Russias, convoked by her Majesty the Queen of the Netherlands, met June 15, 1907, at The Hague, in the Hall of Knights, with the mission to further develop the humanitarian principles which were the basis of the work of the first conference.

In a series of sittings from June 15 to Oct. 18, in which the delegates were constantly animated by a desire to meet the intentions of the initiator of the conference as well as those of the Governments participating, the following conventions were agreed upon for the signature of the plenipotentiaries:

1. The peaceful regulation of international conflicts.
2. Providing for an international prize court.
3. Regulating the rights and duties of neutrals on land.
4. Regulating the rights and duties of neutrals at sea.
5. Covering the laying of submarine mines.
6. The bombardment of towns from the sea.
7. The matter of the collection of contractual debts.
8. The transformation of merchantmen into warships.
9. The treatment of captured crews.
10. The inviolability of fishing boats.-
11. The inviolability of the postal service.
12. The application of the Geneva Convention and the Red Cross to sea warfare and,
13. The laws and customs regulating land warfare.

HAHNEMANN, *hâ'nĕh-mân*, SAMUEL CHRISTIAN FRIEDRICH: 1755, Apr. 10—1843, July 2; b. Meissen, small town near Dresden: German physician. His father—a painter of the ware known as Dresden china—intended his son to follow his own occupation, but the boy showed such love of letters that the head-master of the college (*Fürstenschule*) of Meissen afforded him gratuitously all the advantages of that institution, in which he remained till 20 years of age. He then left Meissen, with 20 crowns as his whole fortune, and went to Leipsic for medical studies. Here he maintained himself by translating works out of Latin, French, and English into German. By industry and frugality, he saved enough money to enable him to visit Vienna, where, under the direction of Dr. Quarin, he pursued his studies, and, after various vicissitudes, he returned to Saxony, and settled in Dresden 1784. He had taken the degree of M.D. at Erlangen 1779. At Dresden he discovered a new salt of mercury, *Mercurius Solubilis Hahnemanni*, still extensively employed by physicians in Germany.

After four years in Dresden, where he had for a time the direction of a large hospital, he returned 1789 to Leipsic. In 1790, while translating Cullen's *Materia Medica* out of English into German, his attention was arrested by the insufficient explanations in that work of the cure of ague by cinchona bark. By way of experiment, he took a large dose of that substance, to ascertain its action on the healthy body. In the course of a few days, he experienced the symptoms of ague; and it then occurred to him that perhaps *the reason why cinchona cures ague is because it has the power to produce symptoms in a healthy person similar to those of ague.* To ascertain the truth of this conjecture, he ransacked the records of medicine for well-attested cures effected by single remedies; and finding what he deemed sufficient evidence of this fact, he advanced a step further, and publicly proposed 1797, to apply this new principle to the discovery of the proper medicines for every form of disease. Soon afterward, he published a case to illustrate his method—a very severe kind of colic cured by a strong dose of *Veratrum album*. Before this substance gave relief to the patient, it excited a severe aggravation of his symptoms: this induced Hahnemann, instead of drops and grains, to give the fraction of a drop or grain, and he thus introduced *infinitesimal* doses. Some years later, he applied his new principle in the treatment of scarlet fever; and finding that belladonna cured the peculiar type of that disease which then prevailed in Germany, he proposed to give this medicine as a *prophylactic*, or preventive against scarlet fever. From that time it has been extensively employed for this purpose. In 1810 he published his great work *Organon of Medicine*, which has been translated into all European languages, and into Arabic. In this book he fully expounded his new system, which he called Homœopathy (q.v.). His next publication was a *Materia Medica*, consisting of a description of the effects of medicines upon persons in health. These works were published 1810–21 at Leipsic, where he founded a school, and was surrounded by disciples. As his system involved the administration of medicines, each separately, and in doses indefinitely minute, there was no longer any need of the apothecary's intervention between the physician and the patient. In consequence of this, the Apothecaries' Company brought to bear on Hahnemann an act forbidding physicians to dispense their own medicines, and with such effect that he was obliged to leave Leipsic. The Grand Duke of Anhalt-Köthen appointed him his physician, and invited him to live at Köthen. Thither he removed 1821, and there he prepared various new editions of his *Organon* and new volumes of his *Materia Medica* for publication. In 1835, he married a second time, left Köthen, and settled in Paris, where he had great reputation till his death. On the centenary of his birth-year, 1855, a statue was erected to his honor at Leipsic.

HAIGHT, *hāt*, CHARLES COOLIDGE: architect: b. New York, 1850, March 17; son of Rev. Benjamin I. H., D.D. He graduated at Columbia College 1861, studied architecture, became asst. inspector-gen. in the civil war, and afterward was appointed architect to the corporation of Trinity Church. His professional work includes designs for the new buildings of Columbia College, the General Theol. Seminary, the Manhattan Eye and Ear Hospital, and the Bar Assoc. in New York, St. Luke's Cathedral, Portland, Me., and other notable structures.

HAIL, n. *hāl* [AS. *hagol;* Ger. *hagel;* Norw. *hagl,* hail; Norw. *hagla,* to fall in drops]: drops of rain frozen while falling: V. to pour down like hail. HAIL'ING, imp. HAILED, pp. *hāld.* HAILY, a. *hāl'ĭ,* consisting of hail. HAIL'STONE, n. a drop of rain frozen while falling. HAIL'STORM, hail, dropping with great force, or driven by the wind.—*Hail* is unfortunately used to denote two phenomena of apparently different origin. In French, we have the terms *grèle* and *grésil*—the former, hail proper; the latter the fine grains, like small shot, which often fall in winter, much more rarely in summer, and sometimes precede snow. The cause of the latter seems to be simply the freezing of rain-drops as they pass in their fall through a colder region of air than that where they originated. We know, by balloon ascents, that even in calm weather different strata of the atmosphere have extremely different temperatures, a stratum far colder than the freezing-point being often observed between two others comparatively warm.

But certain facts tend to show that true hail, though the process of its formation is not perfectly understood, depends mainly upon the meeting of two nearly opposite currents of air—one hot and saturated with vapor, the other very cold. This is shown by such facts as the following. A hailstorm is generally a merely local phenomenon, or, at most, ravages a belt of land of no great breadth, though it may be of considerable length. Hailstorms occur in the greatest development in the warmest season, and at the very warmest period of the day, and generally are most severe in the most tropical climates. A fall of hail generally *precedes,* sometimes accompanies, and rarely if ever follows a thunder-shower. A common notion which has found its way, as many popular prejudices do, into scientific treatises, assigns electricity as the origin of hail; but all observation, rightly interpreted, seems to show that electricity and hail are *results* of the same combination of causes.

When a mass of air saturated with vapor, rising to a higher level, meets a cold one, there is of course instant condensation of vapor into ice by the cold due to expansion; at the same time, there is generally a rapid production of electricity, the effect of which, on such light masses as small hailstones, is to give them in general rapid motion in various directions successively.

These motions are in addition to the vortex motions or eddies, caused in the air by the meeting of the rising and descending currents. The small ice-masses, then moving in all directions, impinge upon each other, sometimes with great force, producing that peculiar rattling sound which almost invariably precedes a hail-shower. At the same time, by a well-known property of ice (see REGELATION), the impinging masses are frozen together; and this process continues until the weight of the accumulated mass enables it to overcome the vortices and the electrical attractions, when it falls as a larger or smaller hailstone. Examining such hailstones, which may have any size from that of a pea to that of a walnut, or even an orange, we at once recognize the composite character which might be expected from such a mode of aggregation. Hailstones in tropical countries are reported to have fallen sometimes as large as a sheep, sometimes large as an ox, or even an elephant! But it is probable that the aggregation in these cases was produced by regelation at the surface of the earth, when a series of large masses had impinged on each other, having fallen successively on the same spot. Whether this be the true explanation or not, it is certain that in British India, at the warmest season, hailstones have remained of considerable size for many days after their fall. A curious instance of the fall of large hail, or, rather, ice-masses, occurred on a British naval vessel off the Cape, 1860, Jan. Here the stones were the size of half-bricks, and beat several of the crew off the rigging, doing serious injury.

A disastrous hailstorm is described in *Mem. de l'Acad. des Sciences*, 1790. This storm passed over parts of Holland and France, 1788, July, travelling *simultaneously* along two miles nearly parallel: the eastern one had a breadth of from half a league to five leagues; the western, of from three to five leagues. The space between varying from three to five and a half leagues wide, was visited only by heavy rain. At the outer border of each portion of the storm, there was also heavy rain; but we are not told how far it extended. The general direction of the meteor was from s.w. to n.e. The length was at least a hundred leagues, probably two hundred. It seems to have originated near the Pyrenees, and to have travelled at a mean rate of about 16½ leagues per hour toward the Baltic, where it was lost sight of. The hail fell for only about 7½ minutes at any one place, and the heaviest hailstones weighed about eight French ounces. This storm devastated 1039 parishes in France alone, doing damage to the extent of nearly $5,000,000. See METEOROLOGY.

HAILES, LORD. See DALRYMPLE, SIR DAVID.

HAILEYBURY COLLEGE, *hā'lĭ-bĕr-ĭ:* in the s.e. border of Herts, England: founded 1805, as a college for the education of the E. India Company's cadets; and used

until the transference of the powers of the E. India Company (q.v.) to the govt. of India (see INDIA, BRITISH) led to the new system for selecting men for the Indian civil service by competitive examination. Its place is now occupied by a high-class school or college, incorporated 1864.

HAILMANN, *hāl'man*, WILLIAM NICHOLAS, American educator: b. Canton Glarus, Switzerland, 1836, Oct. 20. He studied at the medical college of Louisville, Ky., was director of the German-American Seminary at Detroit in 1878–83, in 1894–8 was national superintendent of Indian schools, and in 1898 became superintendent of instruction at Dayton, Ohio. Among his writings are: *History of Pedagogy* (1870); *The Application of Psychology to Teaching* (1887); *Place and Development of Purpose in Education* (1899); *Constructive Form-work* (1901); *The English Language* (1902); *The Laurel Primer* (1903); etc. In 1901 he became head of the department of psychology in the Chicago Normal School.

HAI'MON. See AYMON.

HAIM'SUCKEN. See HAMESUCKEN.

HAIMURA, *hā-mū'ra* (*Erythrinus macrodon*): large fresh-water fish of Guiana, highly esteemed for the table. It belongs to a small family of fishes, *Erythrinidæ*, related to the herring, salmon, and carp families. It is sometimes four ft. in length. The teeth are large, and so formidable, that instances are said to have occurred of a captured haimura biting off a man's hand. The haimura abounds particularly in the upper parts of the rivers of Guiana.

HAIN, or HANE, v. *hān* [Scot.]: to spare; not to expend; to save from exhaustion by bodily labor or fatigue. HAIN'ING, imp. HAINED, pp. *hānd*.

HAIN. See GROSSENHAIN.

HAINAN, *hī-nân'* (Chinese, *Kiung-chow-foo*): large island in the China Sea, constituting a *foo*, or dept., of the province of Kwangtung; about 160 m. long and 90 m. in average breadth; 1200–1400 sq. m.; separated from the mainland by the straits of Hainan, 15–20 m. wide, filled with shoals and reefs. Its capital and principal city is Kiung-chow-foo (q.v.). The interior of the island is mountainous, and only a portion gives submission to the Chinese. Part of the aborigines are wild tribes known as Sheng-li. The s. part has a tropical climate. Earthquakes are frequent. Its productions are rice, sweet potatoes, sugar, tobacco, fruits, timber, and wax. Typhoons, or cyclones, are frequent off the coast during summer. Whaling is pursued here with success by the Chinese. When the Chinese conquered it, B.C. 111, they brought from the mainland 23,000 families. Pop. estimated 2,500,000.

HAINAULT, or Fr. HAINAUT, *ā-nō'* (Ger. *Hennegau*): frontier province of Belgium, bounded s.w. by France. The name may be spelt about 900 different ways, mostly historical, without altering the (French) pronunciation; e.g. *Héno, Haysneaultæ.* Area, 1424 sq. m. The surface consists, in the n. and w., of flat and fruitful plains; the s. is occupied by the Forest of Ardennes. Hills occur only in the s.e., and consequently the course of most of the rivers is toward the w. and n.w. The principal rivers are the Haine—from which the province has its name—the Scheldt, the Dendre, and the Sambra, the last a tributary of the Meuse. The soil is highly productive; wheat and flax are very extensively grown. Excellent breeds of horses, horned cattle, and sheep are reared. Toward the w., in the neighborhood of Mons, are extensive coal-fields: here are more than 200 coal-pits, from which about 2,000,000 tons of coal are annually exported. Iron also is produced in considerable quantity, and marble, building-stone, and limestone are quarried. Linen, porcelain, and pens are extensively manufactured. Pop. (1887) 1,041,719; (1900) 1,142,954.

HAINAUT (or HAINAULT), FRENCH: see NORD (department).

HAINES, *hānz*, DANIEL: 1801, Jan. 6—1877, Jan. 26: b. New York: lawyer. He graduated at the College of New Jersey 1820, was admitted to the bar 1823, settled in Hamburg, N. J., to practice 1824, was elected member of the N. J. council (now senate) 1837, and as a member of the board of canvassers resisted Gov. Pennington in giving certificates of election to the whig candidates in the famous 'broad seal' election. In 1843 he was chosen by the legislature gov. and chancellor of the state, and in his one-year term proclaimed the new constitution and did much to improve the condition of the public schools and establish the N. J. State Normal School. He was re-elected gov. for a three years' term 1847; was judge of the N. J. supreme court 1852–66; member of several judicial commissions 1870–76; commissioner to the National Prison Reform Congress, Cincinnati, 1870; member of the committee to organize the International Congress on Prison Discipline and Reform which met in London 1872, and of which he was a vice-pres.; one of the committee on the re-union of the two branches of the Presb. Church, and a war democrat during the civil war.

HAIR, n. *hār* [Dut. *haer;* Icel. *hár;* Ger. *haar*, hair]: fibres or threads of different degrees of fineness which cover the bodies of many animals; anything very small and fine having length. A HAIR, a single hair; a fine slender thread or filament. THE HAIR, the whole collection or body of threads or filaments growing upon an animal, or upon any distinct part. HAIRY, a. *hār'ĭ*, covered with hair; resembling hair. HAIR'INESS, n. *-nĕs*, the state of being covered or abounding with hair. HAIR'-

LESS, a. without hair. HAIRBELL, or HAREBELL, a wild plant with blue pendulous flowers; the Scotch blue-bell: see under BLUE. HAIRBRAINED, wild and irregular; fickle and unsteady—properly HAREBRAINED, which see under HARE. HAIR-BREADTH, or HAIR'S-BREADTH, a very small distance; among the *Jews*, the 48th part of an inch. HAIR-BRUSH, a brush for smoothing and dressing the hair. HAIR-CLOTH, a woven fabric chiefly composed of horse-hair (see HAIR MANUFACTURES). HAIR-GLOVES, gloves made of horse-hair for rubbing the skin while bathing. HAIR-LINE, a fishing-line made of horse-hair. HAIRLIP, another spelling of HARELIP, which see under HARE. HAIR-MOLD, *här-mōld* [Scot. *har;* Icel. *hárr*, white]: in *Scot.*, the mold on bread like hoar-frost. HAIR-NET, a net for inclosing a woman's hair. HAIR OIL, oil for moistening the hair, usually perfumed. HAIR PENCILS, small brushes made of fine hairs used by artists. HAIR-PIN, a bent wire or a double pin, for fastening a woman's hair. HAIR SALT, a popular name for native sulphate of magnesia, appearing as fine capillary incrustations on damp walls. HAIR SHIRT, n. in *eccles. and chh. hist.*, an instrument of penance, made of horse-hair; strictly speaking it is a broad band rather than a shirt, and is worn round the loins giving to the wearer constant annoyance. Among the Carthusians it forms part of each monk's ordinary apparel. HAIR SIEVE, a strainer with a haircloth bottom. HAIR-SPLITTING, the act or practice of making minute or fine-drawn distinctions. HAIR-SPRING: see BALANCE—BALANCE-SPRING. HAIR-WORM: see GORDIUS. AGAINST THE HAIR, against the grain; contrary to the nature of a person or thing.

HAIR (including bristles, wool, fur, etc.): a modification of the Epidermis (q.v.), and consists essentially of nucleated particles. An ordinary hair consists of a *shaft* and a *bulb*. The shaft is that part which is fully formed and projects beyond the surface. If we trace it to the skin, we find it rooted in a follicle in the cutis or true skin, or even in the connective or cellular tissue beneath it. This follicle is bulbous at its deepest part, like the hair which it contains, and its sides are lined with a layer of cells continuous with the epidermis. At the base of the shaft and inclosed by the swollen or bulbous base is the hair-papilla, which is well supplied with blood-vessels, thus supplying the nourishment necessary for the growth of the hair. When a hair is shed, a new hair may grow in the same follicle from a new papilla. The layer (*b*) in Fig. 1, according to Todd and Bowman (*Physiological Anatomy*, I. 417), 'resembles the cuticle in the rounded form of its deep cells, and the scaly character of the more superficial ones, which are here in contact with the outside of the hair (*c*). The hair grows from the bottom of the follicle, and the cells of the deepest stratum gradually enlarge as they mount in the soft bulb of the hair, which owes its size

to this circumstance. If the hair is to be colored, the pigment cells also are here developed. It frequently happens that the cells in the axis of the bulb become loaded with

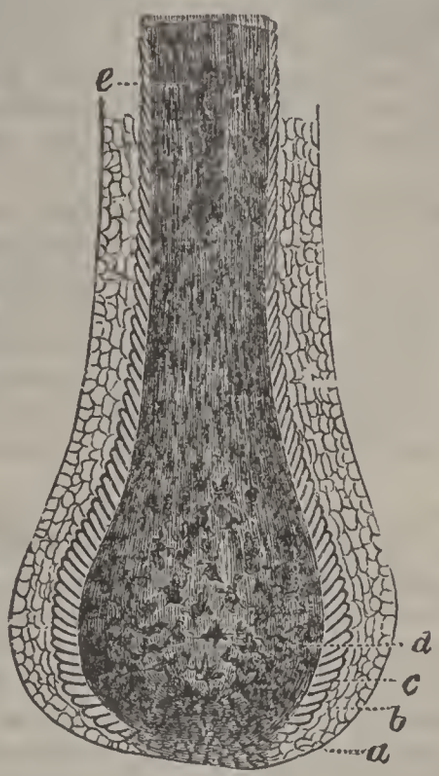


Fig. 1.

Magnified section of bulb of a small black human hair.

a, basement membrane of the follicle; *b*, layer of epidermic cells resting upon it; *c*, layer of imbricated cells, forming the outer lamina, or *cortex*, of the hair; *d*, more bulky cells containing pigment; *e*, a mass of cells in the axis of the hair, loaded with pigment.

pigment at one period, and not at another, so that, as they pass upward in the shaft, a dark central tract is produced, of greater or less length, and the hair appears here and there to be tubular (*e*). The shaft is much narrower than the bulb, and is produced by the rather abrupt condensation and elongation into hard fibres of the cells, both of those which contain pigments and those which do not.' If the tissue is softened by acetic acid, these fibres may be readily seen under the microscope: they seem to be united into a solid rod by a material similar to that which cements the scales of the cuticle. The central cells, when filled with pigment, have less tendency to become fibrous than those lying more externally; and hence some writers have described the centre as a *medulla*, in distinction from the more fibrous part of the shaft, which they term the *cortex*. (This tubular character is constant in the hair of many animals, but is very variable in human hair, and even in the same hair at different parts of its length.) The term *cortex* or *bark* is more correctly applied to the single outermost layer of cells which overlap one another, and cause the sinuous

Fig. 2.

Surface of human hair, magnified.

transverse lines which are seen in examining a hair under the microscope.

In some hairs, especially those which act as tactile organs in some of the lower animals (e.g. in the whiskers of the various cats), a true papilla, furnished with nerves and capillaries, projects into the hair-bulb, and an approach to this papillary projection may often be seen in human hairs.

The hairs, like epidermis, are thus seen to be organized, and to maintain a vital, though not usually a vascular connection with the body. The color of hair seems to depend on the presence of a peculiar oil, which is of a sepia tint in dark hair, blood-red in red hair, and yellowish in fair hair. This oil may be extracted by alcohol or ether, and the hair is then left of grayish-yellow tint. The chemical composition of hair closely resembles that of horn: see HORNY TISSUES.

Hair is extremely strong and elastic; hence its uses for the construction of fishing-lines, the stuffing of cushions, balls, etc. One of its physical properties is, that when dry and warm it is easily rendered electrical, and that it is extremely hygroscopical; readily attracting moisture from the atmosphere, and no doubt from the body also, and yielding it again by evaporation when the air is dry. Hairs elongate very considerably when moist—a property of which Saussure availed himself in the construction of his hygrometer, in which a human hair, by its elongation and contraction, according as the atmosphere is moist or dry, is made to turn a delicate index.

Hairs are found on all parts of the surface of the human body, except the palms of the hands and the soles of the feet; they differ, however, extremely in length, thickness, shape, and color, according to situation, age, sex, or race. The differences dependent on situation, age, and sex are so obvious that we pass them and proceed to the most important differences dependent on race. With respect to the quantity of hair that grows on the human body, there are great differences in different races. The Mongols, and other northern Asiatics who are similar to them, are noted for the deficiency of their hair and for scanty beards, and the same character is ascribed to all the American nations; while among the *Ainos*, or in the Kurilian race, there are individuals who have the hair growing down the back, and covering nearly the whole body. The northern Asiatics and the Americans have generally straight lank hair, while Europeans have it sometimes straight and flowing, and occasionally curled and crisped. Negroes present every possible gradation, from a completely crisp, or what is termed woolly hair, to merely curled, and even to flowing hair: and it is similar with the natives of the islands in the great Southern Ocean. As there is a generally diffused opinion that the head of the African is covered with a species of wool instead of with true hair, it is to be noted that all true wools which have been examined microscopically (as merino wool, the wool of the tiger, rabbit, bear, seal, and wolf-dog, which were investigated by the late Mr. Youatt),

HAIRS.

(Copied from the *Micrographic Dictionary.*)

Fig. 1.—Hairs of Plants.

1, hair of Delphinium Pinnatifidum—magnified 200 diameters; 2, hair of Anchusa Crispa—200 diameters; 3, scale-like hairs from the seed of Cobœa Scandens—50 diameters; 4, stellate hair of ivy leaf—100 diameters; 5, branched hair of Verbuscum Thapsus—25 diameters; 6, stellate hair of Alyssum—100 diameters; 7, horizontal stalked hair of Grevillea Lithidophylla—50 diameters; 8, annulated hairs from seed of Ruellia Formosa, in water—50 diameters; 8*a*, detached cell wall—200 diameters; 9, glandular hair of Byronia Alba—50 diameters; 10, hair from the seed of a Salvia—50 diameters.

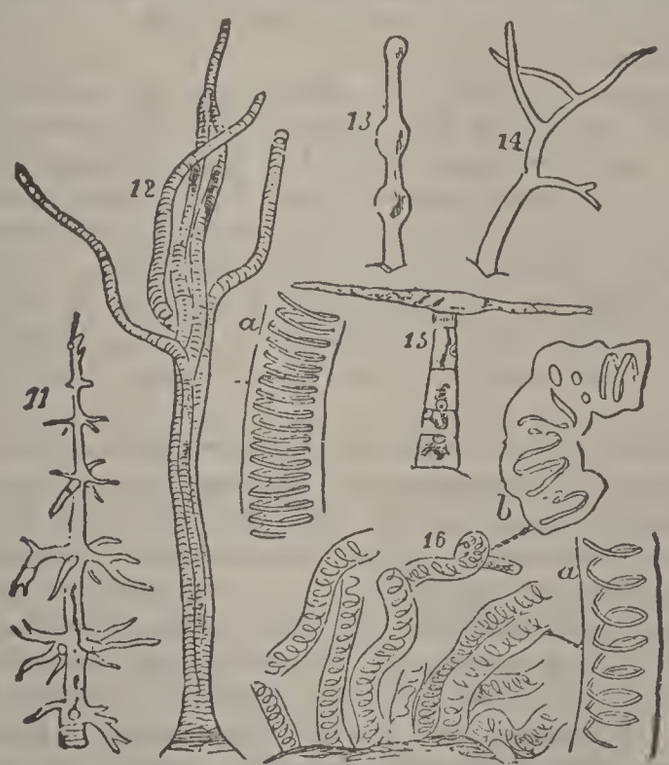


Fig. 2.—Hairs of Plants.

11, branched hair of Alternanthera Axillaris—100 diameters; 12, hair from the seed of Acanthodium Spicatum—50 diameters; *a*, fragment of a branch—200 diameters; 13, hair from the corolla of Antirrhinum Majus—50 diameters; 14, branched hair from epidermis of Sisymbrium Sophia—50 diameters; 15, T-shaped hair of garden Chrysanthemum—50 diameters; 16, spiral fibrous hairs from seed of Collomia Grandiflora, in water—50 diameters; *a* and *b*, fragments showing the cell wall and free fibre.

present a more or less sharply serrated or jagged surface, while hairs present merely an imbricated appearance. This characteristic of wool is shown in Fig. 3, where *a* represents a fibre of merino wool, viewed as a transparent, and *b* as an opaque object. 'Hairs of a negro, of a mulatto, of Europeans, and of some Abyssinians, sent to me (says Dr. Prichard) by M. d'Abbadie, the celebrated traveller, were, together with the wool of a south-down sheep, viewed both as transparent and opaque bodies. The filament of wool had a very rough and irregular surface; the filament of negro's hair, which was extremely unlike that of wool and of all the other varieties mentioned, had the appearance of a cylinder,

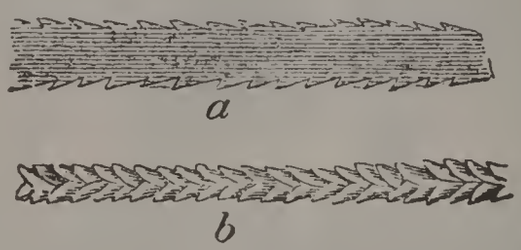


Fig. 3.
Fibre of Wool.

and the coloring matter was apparently much more abundant than in the others.' It is in consequence of the above named difference between hair and wool that, though the former will entangle to a certain degree, it will not felt into a compact mass, which is the characteristic property of good wool.

The grayness of hair in advanced life results from a deficient secretion of pigment. Well-authenticated cases are on record in which the hair has grown gray or white in a single night, from the influence of fear, distress, or any variety of strong mental excitement. It is not easy to explain this phenomenon. Vauquelin suggested that it might result from the secretion at the bulb of some fluid (perhaps an acid), which percolates the hair, and chemically destroys the coloring matter.

HAIR-DRESSING: one of the operations of the toilet. As a matter of convenience, as well as of taste and fashion, the dressing of the hair has received much attention in all civilized nations, ancient and modern. The growth of hair on the sides and lower part of the male face has caused some perplexity in management, and as a method of overcoming the difficulty, shaving has been resorted to, though at the sacrifice of what nature gives to distinguish the male from the female countenance, and also to protect the respiratory organs (see BEARD). The Jews, by their scriptural law, were enjoined not to shave. The Romans shaved, and so did their immediate successors, the Romanized Britons. The Saxons and Danes did not shave, and wore long hair. The Normans shaved, but they, too, adopted long hair

as a fashion; and from them, and the more modern French, the courtiers and cavaliers of the 17th c. adopted the practice of wearing those flowing 'love-locks' which excited the ire of the Puritans. It was, however, in the management of ladies' hair, that the art of the professional hair-dresser was in those times mainly exercised. In the 18th c., through the influence of French fashions, the dressing of hair, male and female, rose to a great pitch of extravagance and folly. The hair of a lady of fashion was frizzed up in convolutions and curls, decorated with ribbons, jewels, and feathers, and filled with pomatum and powder to a degree utterly monstrous. The adjoining figure represents one of those extraordinary head-dresses. As women of less exalted rank slavishly attempted to follow these absurdities, the business of dressing hair was extensively followed. The cost of a full dressing being, however, too high to be lightly incurred, often one dressing was made to suffice for a week or fortnight, during which period such care was taken to preserve the greasy fabric undisturbed, that it became the resort of insects, and how to extinguish these odious pests was in itself a matter of serious concern. From pressure of business, it frequently happened that, previous to balls, ladies' hair had to be dressed one or two days in advance; and to keep the head-dress uninjured, the lady sat in a chair perhaps two nights, instead of going to bed. The writer of this has conversed with a lady who in this manner sat up one night for the sake of her finely powdered and frizzed-up hair. A taxation on hair-powder, with the simplification of fashions consequent on the French revolution, not only expelled hair-powder and perruques, but brought the profession of hair-dresser within reasonable bounds. As regards ladies' hair, fashion is constantly altering; at present the chignon, consisting of cushions at the back or top of the head, and covered with hair, has given way to a system of coils and plaits. With respect to men's hair, short cutting is now universal, and any indulgence in long hair behind is thought to mark a degree of slovenliness or whimsicality of fancy.

Innumerable are the oils, essences, and pomades which are vended for the hair, on the assumption that they improve and nourish it. According to the experience of the best perruquiers, all such applications, any unguent in particular, and however sanctioned by tradition, are injurious: if a smoothing effect is necessary, a very little glycerine is preferable to oil or grease; it should be mixed with six to eight times its quantity of bay-rum or some similar liquid. In ordinary circumstances, regular but not violent brushing is preferable for maintaining cleanliness and glossiness. When the head becomes affected with scurf which the brush does not remove, let the following efficacious and simple method of purification be adopted: Beat up an egg, and rub it well

in all over the head; then pour over it warm water, which, while removing the egg, will likewise carry away all the scurf; lastly, dry thoroughly with a cloth. The head may be held over a small tub during the process. After this, the hair will be very clean, and will take on a fine gloss with a brush. On no account use sharp combs to clean the head, for they are apt to irritate the roots of the hair, and after all fail in the desired object.

HAIR DYE: preparation for altering the color of the hair. Various means have been adopted for changing the natural color of the hair to a more favored one, and for hiding the approaches of age indicated by gray hairs. These usually consists in washing the hair with a solution of some metallic salt known to have the effect of darkening its color. These are the salts of oxides of silver, mercury, lead, and bismuth. The fashion of dyeing the hair is very ancient, and belongs as much to savage as to civilized nations; but in the case of the former, vegetable dyes have been chiefly used; and the women of China and other eastern countries also resort to the same: the juice of the petals of Hibiscus Trionum, the Bladder-Ketmia, and probably other species of Hibiscus, are in general use with them.

The detection of stained hair is sometimes an object of medico-legal investigation. Lead may be detected by boiling the hair in dilute nitric acid, and then applying the test for lead (q.v.) to the acid solution; while the presence of silver may be shown by digesting the hair in dilute hydrochloric acid or chlorine water, when the resulting chloride of silver may be dissolved out with a solution of ammonia, and submitted to the ordinary tests for silver (q.v.).

HAIR-GRASS: a term applied in England to several varieties of native grass belonging to the genus *Aira*. Of these the principal are as follows: Water hair-grass (*A. aquatica*), growing in marshes, very sweet but not suitable for cultivation; Hassock-grass (*A. cæspitosa*), a rank grower in both wet and dry soils, forms large tufts or hassocks, very coarse and contains little nutritive matter; Crested hair-grass (*A. cristata*), sometimes classed in the genus *Poa;* it grows in dry warm soils, also to some extent in moist land: it is only moderately nutritious; Zig-zag hair-grass (*A. flexuosa*), fairly productive, especially in a deep soil: useful in improving land overrun with furze. Like all other grasses of this genus, it needs cutting early in the season. In the United States Hair-grass is known also as Fly-away grass and Tickle-grass (*Agrostis scabra*), and is somewhat similar in appearance, though greatly inferior in quality, to the Redtop (*Agrostis vulgaris*) of the north which is known as Herd's-grass in Pennsylvania and the south. The panicles are large, loose, spread widely from the stalk, and have a marked purple

tinge. Flowers appear early. The branches are long and hairy, when dry are very brittle, and the panicles are easily broken off and carried away by the wind. Thus the seeds are widely disseminated. It is very common in many western states, flourishes on uplands and in low fields that have been drained. It requires early cutting for hay. As it is a decidedly inferior variety of grass it should never be sown in mowings or pastures.

HAIR MANUFAC'TURES: fabrics woven or felted of various kinds of hair; brushes made of particular kinds of hair; and ornamental hair-work.

Woven Fabrics.—The most important is the horse-hair cloth extensively used for covering the seats and backs of chairs, couches, and other articles of furniture; this is made of the long hair of horses' tails. As the hair is of such various colors, it is necessary to dye all the darker shades so as to produce a uniform glossy black; this is done by logwood and sulphate of iron (copperas) in the following manner: The hair must first be cleansed and deprived of its grease by soaking it in lime-water for a day; it is then transferred to the dye-vat, which is thus prepared for a hundredweight of hair. Sufficient water to fill a boiler large enough to receive the hair is boiled with 60 lbs. of cut logwood for three hours, after which it is suffered to cool, when 2 lbs. of copperas are added. This constitutes the bath, as it is called; and the hair, after being removed from the lime-water and well washed in soft-water, either rain or river, is immersed in it for 24 hours; it is then removed and again washed, to free it from the superfluous dye, dried, and shaken out ready for use. Perfectly white horse-hair can be dyed various colors, and is well adapted to receive the brighter ones: hence it has been much used of late years to produce ornamental hair-cloths, which are in great request in some countries, especially in S. America. The weaving of horse-hair cloth is different from that of other tissues, in consequence of the shortness of the hair, which, for the same reason, can be used only for the weft, except in the open or sieve cloth, which is made only in small squares for the sieve makers. Each hair has to be worked singly, and the loom requires two persons to work it. The warp used is either worsted, cotton, or linen yarn, generally the last. The hairs for the weft are kept wet by the side of the weaver, and are handed to him one by one. He receives them on a kind of hook at the end of his shuttle, the hook catching a knot tied by the attendant child who hands the hair. In other respects, the weaving differs little in its general character from that ordinarily employed for other fabrics. When the web is completed, it is dressed by calendering, which gives it a smooth and glossy surface. It is to be regretted that the popular taste does not turn to the ornamental kinds, which are not only

very beautiful, but are durable and easily cleaned. The true crinoline cloth, for ladies' dresses, etc., was at first made of horse-hair, usually white; but the immense demand led to the introduction of agave or aloe fibre, which soon supplanted it for most purposes, except the manufacture of bonnets, for which horse-hair is largely used, both as material for the body of the bonnet, and as trimming. The trade in crinoline trimming in Switzerland and France is large, and considerable quantities are exported. Horse-hair is twisted into thick yarn, and woven into sacking in the ordinary way, in Anatolia and Roumelia; and cow-hair is worked into a rough yarn, and is woven into carpets, in Germany, and, in Norway, is made into socks by the peasants. Pig's hair is similarly employed in China; and among the natives of the Hudson's Bay territories, dog's hair is used for the same purpose. The goat's hair of Tibet and Persia, and the camel's hair used in weaving, belong rather to the true wools. See WOOL.

The difference between hair and wool depends chiefly on the greater or less smoothness of the surface of each fibre: hence the hairs which are smoothest cannot easily be felted; for if brought into contact they have no projections of the surface to keep them from slipping away from each other; but some of the hairs proper, by a little preparation, may be so roughened as to fit them for felting. Thus, coney wool, or the hair of rabbits and hares, if properly moistened with a solution of nitrate of mercury, loses its straight and smooth character in drying, and is then readily felted.

The shorter kinds of horse-hair from the mains and tails, also cow-hair and the softer kinds of pig-hair, are twisted into ropes, which, after being boiled and then thoroughly dried in an oven, are pulled to pieces. The hair retains the twist given it, and is then used for stuffing seats of chairs, etc.

Brushes of hair are of various kinds; some are made of the stiff hairs from the backs of pigs, and others are made of the soft hairs of the camel and other animals. The hairs for the first kind are called bristles (see BRISTLES), which constitute an important trade with various countries. They are used chiefly in the manufacture of hair brushes, clothes brushes, tooth and nail brushes, house-sweeping brooms, the larger kinds of painters' brushes, etc. The second kind are used chiefly in the manufacture of the fine brushes or hair-pencils used by painters and artists. The best bristles come from Russia. Hairs are yielded for this purpose, not only by the camel, but also by the badger, sable, goat, dog, etc. In both cases, the sorting of the hairs into lengths is very important and troublesome. Generally, it is done by placing the hairs in small boxes (with the tips upward), sufficiently deep to keep them upright; and the sorter then, with nice eye and hand, selects the

sizes, by pulling out all the longest, as they overtop the others; then the next size, and so on. This, in the case of the hairs for artists' pencils, is an extremely difficult operation, as great exactness is necessary. Several successful attempts have been made to sort bristles by machinery. Most hair brushes are required to have the bristles or hairs placed with great evenness, so as to form a flat surface outward; but in the case of those which are called artists' and painters' pencils, their value consists in having a fine point, so that the selection of the hairs to insure this is a work of difficulty. The first step is, after selecting a small quantity, to see that all the tips are in one direction; this is usually done in removing them from the skin, a pair of flat-bladed pincers being employed to hold each cut of hairs, whilst the knife or shears severs them from the skin. They are then placed in small, shallow tin boxes, with the tips upward; and the box being carefully shaken, and gently struck on the bottom until the hairs have completely arranged themselves in an upright position, they are then picked out, as before described. Each size is placed by itself; and the brushmaker, according to the kind of pencil he is making, takes the proper size, and separating a sufficient number, they are placed upright in another little tin box, but now with the root-end of the hair uppermost, so as to insure the tips being perfectly even, which is further insured by gently tapping the box as before. Fine thread is then looped round the base of the little bundle of hairs, and securely tied: sometimes more than one ligature is thus made; and the brush then requires only its handle of quill or wood. Artists' pencils being of various sizes, and many extremely small, several kinds of quills are required. These are obtained from several birds, as the swan, goose, duck, fowl, pigeon, lapwing, and even such small ones as the lark and thrush. Previous to receiving the brush, the quills, besides being cut to the required lengths, have to be further prepared by soaking in water, to prevent them from splitting as the thick end of the brush is being pushed down from the wider to the narrower end. They also contract somewhat in drying, and consequently hold the brush very tightly.

Ornamental Hair-work consists chiefly of the human hair plaited into chains, guards, etc., or wrought into various other fanciful devices, as souvenirs, etc. Under this head come also those manufactures of the human hair which are required either to supply a personal deficiency, or to meet the demands of fashion. To the former class belong the wig, the front, and other imitations of the natural covering of the human head; and to the latter, a variety of contrivances, whose mysterious names are known only to barbers and ladies' maids, for the purpose of giving an appearance of greater abundance to the natural supply.

HAIR-POWDER.

The wig, like all other portions of human attire, has undergone a great many variations in fashion. In the present day the great object is, in the first place, as far as possible, to imitate nature and deceive the eye; and, secondly, to produce wigs of extreme lightness—a full-sized peruke rarely being more than two or three ounces in weight. A full head of hair from a young woman's head will sometimes weigh five or six ounces. There are two heads of hair in the South Kensington Museum, which are in the raw state as imported, and weigh together 11½ ounces.—Much of the hair used for such purposes is received through French dealers, who collect it from Holland and Germany, as well as from the various departments of France. The light colors are usually obtained from the former countries, and the dark shades from Brittany; not because these countries yield the finest heads of hair, but because the poverty of the people induces its sale, while the peculiar fashions of the country head-dresses render its loss of little consequence. It is stated that the peasants of France alone supply annually 20,000 lbs. of hair, of the value of $200,000. Some hair is received through German dealers: it is usually of lighter shade than the French.

HAIR-POWDER: pure white powder, made from pulverized starch, scented with violet or some other perfume, and formerly much used for powdering over the head. The strange fashion of using hair-powder is said to have originated from some of the balled-singers at the fair of St. Germain, in France, whitening their heads to render themselves more attractive. Introduced into Great Britain, the fashion became universal among the higher and middle classes, with women as well as men. To make the powder hold the hair was usually greased with pomade, and accordingly the fashion was extremely troublesome. An act of parliament fixed that the fine dust of which the powder was composed should be made from starch alone; and we learn from the *Gentleman's Magazine*, that 51 barbers were convicted before the commissioners of excise in London, 1746, Nov. 20, and fined £20 each, for having in their keeping hair-powder not made of starch, contrary to act of parliament; and on the 27th, 49 others were fined, for the like offense, in the same penalty. In 1795, a tax of a guinea was put on the use of hair-powder, and at one time yielded £20,000 per annum, but it had the effect of causing hair-powder to fall into general disuse. The French revolution, which overturned so many institutions, contributed also to a return by the people of Europe to natural and unpowdered hair. When gentlemen first left off hair-powder with queues, they were considered very unfashionable; and the custom of having the hair cut short, now quite universal, was deemed vulgar. At the present day, in Europe, powder is used by

some of the footmen of the nobility and higher ranks as part of their livery; and occasionally, at public or private *bals costumés*, ladies and gentlemen still appear with their heads powdered.

HAIRS, in Botany: filaments very different from the hair of animals, though there is sometimes considerable general resemblance, and the same purpose of protection from cold and from various atmospheric influences seem also to be sometimes served by them. They are produced by no special organ analogous to the bulbs from which the hairs of animals grow, but are composed of cellular tissue, arise from the epidermis, and are covered with extensions of the cuticle. Some hairs consist of a single elongated cell; some of several cells placed end to end. The gradations are quite indefinite between the most elongated hairs and the mere warts or rugosities which often appear on the surface of plants. In like manner, hairs in botany pass into *bristles* (*setæ*) and prickles (*aculei*), which are merely stronger and harder hairs; but spines or thorns are totally different, arising from the wood of the stem or branch. Hairs in botany are very often connected with *glands*, which are cells or clusters of cells, producing secretions; hairs often arise from glands, and then generally serve as ducts through which the secretion may pass; hairs also often bear glands at their apex. Stinging hairs, as in Nettles, *Loasas*, and some *Malpighias* (see these titles), are ducts with venom-secreting glands at their base.

HAIRST, n. *hārst* [AS. *hœrfest;* prov. Ger. *herfst*, harvest: Icel. *haust*, autumn (see HARVEST)]: in *Scot.*, the harvest, or harvest time.

HAIR-TAIL (*Trichiurus*): genus of acanthopterous fishes, which, on account of their compressed and very elongated form have been classed in the Ribbon-fish family, but are otherwise allied to the mackerel, tunny, etc., and are therefore, in recent systematic works, referred to the family *Scomberidœ*. The dorsal fin extends along the whole back, and is spiny throughout: there are no ventral fins, no anal fin, and no tail fin, the tail ending in a single elongated filament. One species, the SILVERY H. (*T. lepturus*), sometimes called the Blade-fish, is found in the Atlantic Ocean, and has been cast on the shores of Britain, but is more common in warmer regions. It is called Sabre-fish in Cuba. It sometimes attains a length of 12 ft. Its flesh is good. An E. Indian species, the SAVALA (*T. Savala*), is much esteemed for food, and commonly sold in the markets of India.

HAIRUM'BO. See CACHAR.

HAI'TI. See HAYTI.

HAIVERS, or HAVERS, n. plu. *hā'vėrz:* in *Scot.*, foolish talk; incoherent speech; information unworthy of credit.

HAJDUK, or HAIDUCK, or corruptly, HEYDUKE, *hī'dûk* [Hungarian, *drover, cowherd*]: name of the population of a dist. in e. Hungary. The Hajduk are direct descendants of those warriors, who, during the long and bloody contest between the House of Hapsburg and the Prot. insurgents of Hungary, form the nucleus of Prince Stephen Bocskay's valiant armies. The Hajduk enjoyed privileges of nobility, and immunities from taxation ever since 1605, in which year the whole tract of land which is their possession to the present day was given them by the above-named munificent prince. Notwithstanding repeated attempts made by the Austrian government against their privileges, the Hajduk retained the peculiar organization of their district, until after the disastrous struggle of 1848–49, when they were reduced to the same level with the so-called hereditary provinces of the empire. At the dawn of the Reformation, the Hajduk were among the first to adopt Calvin's doctrines (designated during a long period 'the Hungarian faith,' in opposition to Luther, whose followers were chiefly among the Slaves of Upper Hungary). The Hajduk are almost exclusively occupied in agriculture. In 1876, the country of the Hajduk was incorporated with portions of two adjoining districts, and formed into a new administrative division called *Haiduken-comitat*, with Debreczia as capital. See DEBRECZIN.

HAJILIJ, *hăj'ĭ-lĭj*, or BITO-TREE, *bē'tō-trē* (*Balanites Ægyptiaca*): tree of nat. ord. *Amyridaceæ*, native of Egypt and of central Africa; cultivated for its fruit, a drupe, which is edible, and from the seeds of which a fixed oil is expressed, called *Zachun*. So much is this tree valued in central Africa, that there is a common proverb to the effect that a milch cow and a bito-tree are the same. (Barth's *Travels*.)

HAJJ, *hăj* (whence HADJI, or HAJI, *hăj'ē*, or HAGGE), [(Heb. *Hag*, one of the three festivals appointed to the Jews for the purpose of pilgrimage to Jerusalem); Arab. pilgrimage]: emphatically, pilgrimage to the Kaaba (q.v.) or the temple of Mecca which every Mohammedan, male or female, whose means and health permit, is bound to perform, at least once in his life, otherwise, 'he or she might as well die a Jew or a Christian.' Mohammed, after many fruitless attempts to abolish altogether the old custom of pilgrimage—prevalent among most peoples in ancient, and some in modern times, perhaps arising from an innate travelling propensity, but not unfrequently fraught with mischievous consequences—was compelled finally to confirm it, only taking care to annul its idolatrous rites, and to destroy the great number of ancient idols around Mecca. The 12th month of the Mohammedan year, the Dsul Hajjeh, is the time fixed for the celebration of the solemnities; and the pilgrims have to set out for their journey one or two months before (in Shawâl or Dhulkada), according

to their respective distances. They assemble first at certain variously appointed places near Mecca, in the beginning of the holy month, and the commencement of the rites is made by the male pilgrims here first putting on the Ihrâm or sacred habit, which consists of two woolen wrappers—one around their middle, the other around their shoulders; their head remains bare, and their slippers must neither cover the heel nor the instep. It is enjoined that the pilgrims, while they wear this dress, should be particularly careful to bring their words and thoughts into harmony with the sanctity of the territory that they tread, a territory in which even the life of animals is to be held sacred from any attack. Arrived at Mecca, the pilgrims proceed at once to the temple, and begin the holy rites there by walking first quickly, then slowly, seven times round the Kaaba, starting from the corner where the black stone is fixed (Tawaf). This ceremony is followed by the Sai, or running, likewise performed first slowly, then quickly, between the two mounts Safâ and Merwa, where, before Mohammed's time, the two idols Asaf and Nayelah had been worshipped. The next rite takes place on the ninth of the Dhulhajja, and consists in the Wukuf or standing in prayer on the mountain of Arafat, near Mecca, till sunset. The whole of the succeeding night is spent in holy devotions at Mogdalifa, between Arafat and Mina. The next morning by daybreak, the pilgrims visit the Masheral-Haram, the sacred monument (a place where, as legend relates, the Prophet stood so long in prayer that his face began to shine), and then proceed to the valley of Mirra, where they throw seven (or seventy) stones at three pillars, for the purpose of putting the devil to flight. The pilgrimage is completed with the slaughtering of the sacrifices on the same day and in the same place. The sacrifice over, they shave their heads and cut their nails, burying the latter on the same spot. They then take leave of the Kaaba, and, taking with them some sacred souvenirs, such as dust from the Prophet's tomb, water from the well Zemzem, etc., they proceed to their homes. The return of the holy caravans is watched everywhere with the most intense anxiety, and is celebrated with great pomp and rejoicings. Henceforth, the pilgrim never omits to prefix the proud name of Hajji to his name. It is permitted that those who, through bodily infirmity, are incapacitated from performing the holy journey themselves, may send a substitute, who acts as their representative in almost every respect, but this substitute has no share whatever in the merits and rewards belonging to the Hajj.

HAJJI KHALFA, *hâj'ē ċhâl'fa*, or HADJI KHALIFAH, *hâj'ē ċhâl'ĭ-fa*, a surname of MUSTAFA-BEN-ABDALLAH, KÂTIB CHELEPI: celebrated Turkish historian: abt. 1600–1658, Sep.; b. Constantinople. He was employed in the Turkish armv 1622–33, and had excellent opportunity

for acquiring information regarding history, geography, etc., of which he eagerly availed himself. Hajji Khalfa's works are in Turkish, Arabic and Persian. Besides a number of smaller works on geography and history, we have the celebrated *Asam al-kotoub ve al-fonoum* (Names of Books and Sciences), written in Arabic, and of which Flügel has given a translation with the text under the title *Lexicon Bibliographicum et Encyclopædicum a Mustafa-ben-Abdallah* (Leip., 1835–58, 7 vols.). There is also a French translation by Petis de la Croix (1694–1705), in MS. in the Imperial Library. In this work, Hajji Khalfa gives a definition of each science and the principal writers on each; specifies the titles, contents, language, dates of composition, and translations of more than 25,000 works; also the names of the authors and dates of their death. It is the most complete catalogue in existence of works in Arabic, Persian, and Turkish. There is also *Tarikh Kebir* (Great History), a history of the world from the creation of Adam to 1655, containing notices of 150 dynasties, principally Asiatic; also a history of the Ottoman empire 1591–1658; and a history of the maritime wars of the Turks, which has been translated into English (Lond. 1831).

HAKE, n. *hāk* [Norw. *hakefish*, a fish with a hooked under jaw—from *hake*, a hook: comp. Icel. *haka*, the chin, with reference to its peculiar under jaw]: an iron hook; a kind of sea-fish allied to the cod, so called from having a hooked jaw—see below.

HAKE (*Merluccius*): genus of fishes of the cod family (*Gadidæ*), having a flattened head, an elongated body, two dorsal fins, of which the first is short and the second very long, one very long anal fin, and the mouth destitute of barbels. The COMMON HAKE (*M. vulgaris*), is found in the seas of n. Europe, and in the Mediterranean. It is sometimes three or four ft. in length; of whitish color, grayish on the back. It is very voracious, devouring great numbers of herrings and pilchards; hence it is frequently called the *Herring Hake*. It is coarse; its flesh white and flaky; but it is important as an article of human food and of commerce; being salted and dried in the same manner as cod and ling, in common with which it receives in this state the name *stock-fish*. It is generally taken by lines, like cod and ling. In the spawning season, when it keeps near the bottom, it is sometimes caught by trawl-nets. Other species of hake are found in high southern latitudes, and a species closely allied, on the w. coast of S. America. The fish called hake in the United States, is the Forked Beard (*Physis furcatus* and *Raniceps trifurcatus*), a much better fish than the true hake.

HAKEMITE, n. *hâ'kĕm-īt:* relating to Hakem, a Fatimide caliph, who ruled in Egypt 996–1021; also, relating to astronomical tables published while he reigned.

Some of these were constructed by Ebn Yunis, others by Abul-Wefa about 1000.

HAKIM, or HAKEEM, n. *hăk-ēm'* [Ar.]: in the *East*, a wise man; a physician.

HA'KIM (in full, EL HAKIM BI-AMRILLAH ABU 'ALEE MANSUR): 985–1020. See DRUSES.

HAKIM BEN ALLAH, *hâ-kĭm bĕn âl'la*, or BEN HASHEM, *bĕn hâ'shĕm*, or 'ATA, *ât'â*, called Al Mokanna (the Veiled), or Sagende Nah (Moon-maker): founder of an Arabic sect that appeared in the 8th c. during the reign of Mahadi, the third Abassidian caliph, at Neksheb, or Meru in Khorassan: died by suicide, 779–80. H. is said to have commenced his extraordinary career as a common soldier, but to have finally put himself at the head of a band of his own. In a fight an arrow pierced one of his eyes, and in order to hide this deformity he henceforth constantly wore a veil, a habit attributed by other writers (Rhondemir, etc.) to a desire to conceal his extraordinary ugliness—by his own followers, however, to the necessity of shrouding the dazzling rays which issued from his divine countenance from the eye of the beholder. H. set himself up as God. He had first, he said, assumed the body of Adam, then that of Noah, and subsequently of many other wise and great men. The last human form he pretended to have adopted was that of Abu Moslem, a prince of Khorassan. Thabari sees in this idea of metempsychosis the Jewish notion of the Shekinah—the divinity resting on some one chosen person or place—and infers that H. may have been of Jewish origin. He appears to have been well versed in the art of legerdemain and 'natural magic,' principally as regards producing startling effects of light and color. Among other miracles, he for a whole week, to the delight and bewilderment of his soldiers, caused a brilliant moon or moons to issue from a deep well. H. found many adherents; and ere long he seized several fortified places near the cities of Neksheb and Kesh. Sultan Mahadi marched against him, and utterly overthrew him. Some remnants of his sect still exist, distinguished by their white garb, in opposition to the black color adopted by the Abassidian caliphs. See MOHAMMEDAN SECTS. H. has furnished the subject of many romances, of which one in Moore's *Lalla Rookh* is most brilliant and best known.

HAKLUYT (or HACKLUYT), *hăk'lôt*, RICHARD, D.D.: English geographer: abt. 1553–1616, Nov. (not 1626 as by an error in the Abbey register); b. in or near London, of a Welsh family. While at Westminster School he eagerly perused narratives of voyages and travels, and continued this course at Christ-church, Oxford, whither he proceeded 1575. Being appointed lecturer on geography or cosmography in that university, he introduced the use of globes and other geographical appliances into

English schools. Private individuals, as well as commercial companies and towns, consulted him respecting nautical enterprises. In 1584, he went as chaplain to the English embassy to Paris where he printed at his own expense Laudonnière's manuscript narrative of the discovery of Florida printed first in French afterward in English. On his return to England with the assistance of Sir Walter Raleigh, he began to collect materials for the history of discoveries by his countrymen. He published the results in notices of more than 200 voyages, under the title *Principal Navigations, Voyages, Traffiques, and Discoveries of the English Nation* (Lond. 1589; new ed., 5 vols. Lond. 1809–12). Government rewarded him with a prebend in Westminster Abbey, and a living in Suffolk. *A Selection of Curious, Rare, and Early Voyages and Histories of Interesting Discoveries*, etc., published chiefly by Hakluyt or at his suggestion, but not included in his celebrated compilation (4to, Lond. 1812), forms a supplement to the above works. He was buried in Westminster Abbey. Hakluyt's unpublished manuscripts were made use of by Purchas in his *Pilgrims*. An island in Baffin's bay was named after him by Bylot, and a promontory in Spitzbergen by Hudson. The *Hakluyt Society*, instituted 1846, took its name from him: its object is the publication of all the histories of the earlier voyages and travels. Between 1847 and 1900 fully 100 volumes were issued under the editorial supervision of eminent authorities. Among these publications were: *Select Letters of Columbus* (1849); Raleigh, *Guiana* (1848); and *Danish Arctic Expedition* (1897).

HAKODADI, *hâ-kō-dâ'dē*, or HAKODATE, *hâ-kō-dâ'tā:* most northern of the open ports of Japan: 41° 40′ n. lat., and 141° 15′ e. long. The town stretches three m. along the base of a lofty promontory which juts into the strait of T'zagar, from the s. extremity of the island of Yesso. It is connected with the mainland by a low alluvial isthmus, and separated from the mountainous region to the n. by a plain bordered by an amphitheatre of hills. The adjacent scenery is striking and picturesque, closely resembling that of Gibraltar. Hakodadi was ceded to the Tycoon by the Prince of Matsumai 1854. It was then a poor fishing-village, but has now become a place of importance. The houses are single story, fragile wooden buildings. The streets are between 30 and 40 ft. wide, clean, well drained, and macadamized. In 1869, June, after the revolution, the Mikado's forces attacked Hakodadi, which was occupied by the rebels, and a great part of the town was laid in ashes. Considering the latitude of Hakodadi, its climate is severe, and during its winter season the thermometer has indicated 18° below zero. The observations of 1859 make its summer nearly correspond to that of Edinburgh. The snow disappears about the beginning of April

(though it often lies on the mountains until midsummer); and torrents of rain, brought up from the Pacific by the s.e. wind, quickly deluge the recently snow-denuded ground. Hakodadi is said not to be healthful, yet longevity is frequent. The harbor is one of the finest and largest in the world, but difficult of access; it is divided into an outer and inner harbor. By article three of the Treaty of Yedo (1858, Aug. 26), Hakodadi was, together with Kanagawa and Nagasaki, opened to foreign commerce 1859, July 1. It maintains commercial intercourse with all the large ports of Japan. There is a large fluctuating population connected with the fisheries. Pop. about 80,000.

HAL, *hâl:* town of Belgium, in S. Brabant, 10 m. from Brussels. The beautiful Gothic church of St. Mary, dating from 14th c., is much resorted to by pilgrims on account of a black miracle-working wooden image of the Virgin. The town is on the Mons railway, and has some manufactures. Pop. about 8,000.

HALACHA, *hă'la-ka* or *ha-lâ'ka* [Heb. Rule]: general term for the Jewish oral law, which runs parallel with the written law contained in the Bible, and is supposed by the Jews to be likewise of divine origin. Its relation to the ordinances contained in the Pentateuch is that of an amplified code to the fundamental, religious, and civil maxims—such as the changes wrought by time in the inner and outer relations of a rapidly increasing people would of necessity produce. Handed down through a long chain of highest authorities (Sinaitic revelation, Moses, Joshua, Elders, Great Synagogue [Ezra], etc.), it could only be treated and further developed by the foremost men of each generation—such, in fact, as through their eminence in learning belonged to a kind of aristocracy of mind (Chachamim, Wise Men), towering above the multitude (Hediotim, idiots). Their decision on all ordinances involved in contradictory traditions was final, because it was believed to spring from a deeper apprehension of Scripture. Often, indeed, they had recourse, to give their opinion greater weight, to certain special letters, words, and even signs in the Scripture, which, seemingly superfluous where they stood, were supposed to point to the injunction under discussion. Halacha embraces the whole field of juridico-political, religious, and practical life, down to its most minute and insignificant details. Originally, the Oral Law, by way of eminence, it began to be written down when the sufferings, to which the Jews were almost uninterruptedly subjected after the first exile, had made many portions of it already very uncertain and fluctuating, and threatened finally to obliterate it from memory. The first collection of laws was instituted by Hillel, Akiba, and Simon ben Gamaliel; but the final reduction of the general code, Mishna (q.v.), is due to Jehudah Hanassi, A.D. 220. Later ad-

ditions to this code are formed by the Baraithas and Toseftas. Of an earlier date with respect to their contents, but committed to writing in later times, are the three books (Midrashim): Sifra or Thorath Kohanim (amplification of Leviticus), Sifri (of Numbers and Deuteronomy), and Mechiltha (of a portion of Exodus). The masters of the Mishnaic period, after the Soferim, are the Thanaim. These were followed by the Amoraim, who, by discussing and further amplifying the Mishna, became the authors of the Gemara (q.v.), a work extant in two redactions—that of Palestine and of Babylon. The Halacha was further developed in subsequent centuries by the Saboraim, Geonim, and the authorities of each generation. See also MIDRASH; MISHNA; TALMUD.

HALAS, *hŏh'lŏsh':* town of Hungary, dist. of Little Cumania, on the lake of Halastó, about 80 m. s.s.e. of Pesth. The people are employed chiefly in agriculture and cultivation of the vine. Pop. 15,039.

HALATION, n. *hā-lā'shŭn:* in *phot.*, an appearance, as of a halo of light, surrounding the edge of a dark object in a photographic picture developed upon iodide of silver; it causes a disagreeable hardness of outline.

HALBERD, or HAL'BERT, n. *hăl'bėrd* or *-bėrt*, also HALBART [Ger. *hellebarde*, a kind of spear: OF. *halebarde*, a halberd—from Swiss, *halm*, the handle of an ax (some say Ger. *hild*, battle), and O.H.G. *parten;* Ger. *barte*, a broad ax]: weapon borne in the British army till the close of the 18th c., by all sergeants of foot, artillery, and marines, and by companies of halberdiers in the various regiments. It consisted of a strong wooden shaft about 6 ft. in length, surmounted by an instrument much resembling a bill-hook, constructed alike for cutting and thrusting—a sort of battle-ax—with a cross-piece of steel, less sharp, for the purpose of pushing; one end of this cross-piece was turned down as a hook, for use in tearing down works against which an attack was made. The invention of the halberd is claimed by the Swiss and Danes; probably each produced something resembling it. The halberd appeared in England about the time of Henry VIII., and maintained its position more than two centuries. Now, it is rarely seen except on certain ceremonial occasions. HAL'BERDIER', n. *-dēr'*, one who carries a halberd. TIED TO THE HALBERTS, strapped up to crossed halberts or beams to be punished by flogging: said metaphorically of a man put up for any kind of social punishment where he cannot help himself, or where resistance is vain—as a work adversely criticised and ridiculed whose author has nothing to say in his own defense.

HALBERSTADT, *hâl'bēr-stât:* ancient and quiet town of Prussian Saxony, govt. of Magdeburg, 30 m. s.w. of the city of Magdeburg: amid fruitful plains on the

Holzemme, tributary of the Saal. It is well built; its streets mostly are long, broad, and moderately straight: and among its notable buildings are the Church of Our Lady (1005–1284), in Byzantine style; and the cathedral, an elegantly proportioned Gothic edifice, begun in the middle of the 13th c., and dedicated to St. Stephen. Halberstadt has two good libraries, and numerous collections of paintings, coins, and antiquities, which, with the Poetical Society (Dichterverein), formed by the poet Gleim, have maintained here a lively appreciation for the arts and sciences. The manufactures are woolen and cotton fabrics, leather, soap, gloves, tobacco, and cigars; brewing and oil refining are carried on extensively. Pop. about 35,000.

HALCYON, n. *hăl'sĭ-ŏn* [L. *halcyon*, or *alcyon;* Gr. *halkŭōn*, the kingfisher, halcyon]: a name formerly given to the bird kingfisher (q.v.), said to lay its eggs near the sea in calm weather; a bird fabled to incubate on the sea, which so brought about calm weather: ADJ. calm; quiet; undisturbed; peaceful. HALCYON DAYS, the name given by the ancients to the seven days which precede and the seven which follow the winter solstice, from the supposed circumstance of the *halcyon* selecting that period for incubation; days of peace and tranquillity. HALCYONIDÆ: see KINGFISHER. HALCYORNIS, n. *hăl'sĭ-ŏr'nĭs* [Gr. *ornis*, a bird]: in *geol.*, an extinct bird whose remains occur in the eocene Tertiaries.

HALDANE, *hăl'dān*, JAMES ALEXANDER: 1768, July 14—1851, Feb. 8; b. Dundee, Scotland; brother of Robert Haldane (q.v.). He was educated at Dundee and the High School and University of Edinburgh, became a midshipman in the service of the E. India Company when 16 years old, and after 4 voyages to India was promoted master of the *Melville Castle* 1793. Before the ship sailed he experienced a religious change, and, determining to engage in missionary labor, he sold his commission and interest in the ship for $60,000, and returned to Scotland. He made several tours of the country, distributing tracts and holding prayer, Bible, and preaching meetings, generally in the open air; joined his brother ROBERT and others in forming the Soc. for the Propagation of the Gospel at Home 1797, Dec.; spent two years organizing congregations through Scotland, for which his brother erected churches; was ordained pastor of a large congregation in Edinburgh as an Independent or Congregationalist 1799; avowed his change to Bapt. views 1808; and preached gratuitously to his Tabernacle congregation for more than 50 years. He published many controversial pamphlets, the latest being *Doctrine of the Atonement* (1845), and *Exposition of the Epistle to the Galatians* (1848).

HAL'DANE, ROBERT: philanthropist: 1764, Feb. 28—1842, Dec. 12; b. London; brother of James Alexander Haldane. He was educated in the Dundee Grammar

School and the Edinburgh High School and Univ., and though heir to a large estate entered the royal navy 1780. He first served under his uncle Lord Duncan, commander of the *Monarch*, was transferred to the *Foudroyant* 1781, and distinguished himself in the engagement with the *Pegase*, took part in the relief of Gibraltar, resigned from the navy 1783, and settled on his estate of Airthrey 1785. In 1793 he became deeply interested in religion, and resolved to devote his life and means to the advancement of Christianity. In 1796 he sold a large part of his estate and began organizing a vast scheme of missionary labor in India for which he was to provide the total expense; but at the last moment he was compelled to abandon his project by the hostility of the E. India Company, which was suspicious of his motives. He then organized the Soc. for the Propagation of the Gospel at Home 1797, Dec., and as his brother gathered congregations in various parts of Scotland he used his money in building houses of worship, supporting missionaries, and founding and maintaining schools for the education of young men for the ministry. During the ensuing 12 years he is said to have expended more than $350,000 in this work; and he was credited with having educated 300 ministers at an expense of $100,000 during his lifetime. He was in Geneva 1816, and in Montauban 1817, lecturing with great success to theol. students in both cities; returned to Scotland 1819, and passed the latter part of his life in discussing the leading religious controversies of the day. Though he seceded from the established Presb. Church, and adopted many of the views of Robert Sandeman, he was strictly unsectarian in all his work. He published *Evidences and Authority of Divine Revelation* (1816), *Commentary on the Epistle to the Romans* (1819), *On the Inspiration of Scripture* (1828), and *Exposition of the Epistle to the Romans* (1835).

HALDEMAN, *hawl'dė-man*, SAMUEL STEHMAN, A.M., LL.D.: 1813, Aug. 12—1880, Sep. 10; b. Locust Grove, Penn.: naturalist. He received a classical and collegiate education but did not graduate, was asst. in the N. J. geological survey 1836, and in the Penn. 1837–42; prof. of natural sciences in the Univ. of Penn. 1851–55, similar prof. in Del. College 1855, prof. of geology and chemistry in the State Agricultural College of Penn., and prof. of comparative philology in the Univ. of Penn. from 1869 till his death. He published numerous works on conchology, entomology, and paleontology, and his *Analytic Orthography*, or investigations into the philosophy of language, obtained in England the highest Trevelyan prize over 18 competitors 1858. His works include: *Fresh-Water Univalve Mollusca of the United States* (1840); *Zoological Contributions* (1842–3); *Elements of Latin Pronunciation* (1851); *Affixes in Their Origin and Application* (1865); *Pennsylvania*

Dutch (1872); *Outlines of Etymology* (1877); *Analytic Orthography* (1858); etc.

HALE, a. *hāl* [Goth. *hails;* AS. *hal*, sound, healthy: Icel. *heill*, whole]: sound of body; healthy; not impaired: N. in *OE.*, welfare. *Note.*—WHOLE, HAIL 2, and HALE 1 are identical.

HALE, v. *hāl*, or *hâl* [F. *haler*, to haul, to tow: Dut. *halen;* Dan. *hale*, to draw, to pull (see HAUL)]: to drag by force; to drag violently. HA'LING, imp. HALED, pp. *hāld.*

HALE, *hāl*, DAVID: 1791, Apr. 25—1849, Jan. 25; b. Lisbon, Conn.: journalist. He received a public school education, removed to Boston 1809, unsuccessfully engaged in mercantile business, became associate editor of the *New York Journal of Commerce* 1827, and joint proprietor with Gerald Hallock 1828, advocated free-trade, the sub-treasury scheme, and the chief democratic measures of the day, purchased the Broadway Tabernacle, New York, for a Congl. church, since removed to Sixth Ave. and 34th St.; supported several missionaries, and contributed liberally to various religious and benevolent interests, especially of the Congl. churches.

HALE, EDWARD EVERETT, S.T.D., LL.D.: Unitarian minister and author: b. Boston, 1822, Apr. 3. He graduated at Harvard College 1839, studied theol. and ecclesiastical history privately, was licensed to preach 1842, and after supplying various congregations was pastor of the Church of the Unity, Worcester, 1846–56, and was then called to the South Congl. (Unit.) Church, Boston, where he (1889) remains. During his ministerial career he has been active in social, educational, and philanthropic enterprise; organized the Harry Wadsworth Club, which has numerous branches in the United States and Europe, and the Lookup Legion among American Sunday-schools; edited *The Christian Examiner*, *The Sunday School Gazette, Old and New* 1869–75; and *Lend a Hand, a Journal of Organized Charity;* beside *Original Documents from the State Paper Office, London, and the British Museum, Illustrating the History of Sir W. Raleigh's First American Colony and the Colony of Jamestown* (1860), John Lingard's *History of England*, 13 vols., and many historical works, pamphlets, and papers; contributed largely to the periodical press; and attained wide popularity as a lecturer. To the rising generation he is best known as a writer of charming fiction and history. His publications in these lines include: *The Rosary* (1848), *Margaret Percival in America* (1850), *Sketches of Christian History* (1850), *Kansas and Nebraska* (1854), *My Double and How he Undid Me* (1859), *Ninety Days' Worth of Europe* (1861), *The Man Without a Country* (1863), *The Skeleton in the Closet* (1866), *If, Yes, and Perhaps* (1868), *The Ingham Papers* (1869), *His Level Best, and Other Stories*

(1870), *Daily Bread, and Other Stories* (1870), *Ups and Downs* (1871), *Sybaris* (1871), *Christmas Eve and Christmas Day* (1874), *In His Name* (1874), *The Good Time Coming* (1875), *One Hundred Years* (1875), *Back to Back* (1877), *What Career?* (1878), *Crusoe in New York* (1880), *Stories of War* (1880), *June to May* (1881), *Stories of the Sea* (1881), *Stories of Adventure* (1881), *Stories of Discovery* (1883), *Seven Spanish Cities* (1883), *Christmas in a Palace* (1884), *Stories of Invention* (1885), *Easter* (1886), *Franklin in France* (1887), *The Life of Washington* (1887), *They Saw a Great Light* (1889), *The Story of Christopher Columbus* (1891), *East and West, or the New Ohio* (1892), *Historic Boston* (1898), *Lowell and His Friends* (1899), *Memoirs of a Hundred Years* (1902), *Ralph Waldo Emerson* (1902), *We, the People* (1903), *New England Ballads* (1903), *Prayers in the United States Senate* (1904), etc. He also edited Modern Achievements (10 vols., 1905).

HALE, Eugene, American politician: b. Turner, Oxford County, Me., 1836, June 9. After study of law he was admitted to the bar in 1857, began practice at Ellsworth, Me., and was a member of the Maine legislature in 1867, 1868 and 1880. In 1868 he was elected representative to Congress, and in that capacity served until 1878, acting on the committee on appropriations, and during his last term being chairman of the Republican congressional committee. In 1868, 1876 and 1880 he was a delegate to the Republican national conventions of those years, in 1874 was offered the post of postmaster-general and in 1877 that of secretary of the navy, but declined both. He was a member of Grant's commission appointed for canvass of the Louisiana presidential vote in 1876. He succeeded Hannibal Hamlin in the United States Senate in 1881, and was re-elected in 1887, 1893, 1899 and 1905. In the Senate he became known as a Republican leader, interesting as a speaker and skilful in matters of legislative routine.

HALE, George Ellery, American astronomer: b. Chicago, 1868, June 29. He was graduated from the Massachusetts Institute of Technology in 1890, studied also in the Harvard observatory and at Berlin, was professor of astrophysics at Beloit College in 1891–3, lecturer in astrophysics in Northwestern University, 1891–3, associate professor of astrophysics in the University of Chicago, 1892–7, became director of the Yerkes Observatory (Williams Bay, Wis.) of the university, 1895–1905, professor of astrophysics, 1897–1905, and in 1905 director of the solar observatory of Carnegie Institute at Mt. Wilson, Cal. He edited the *Astrophysical Journal* from 1895, and published papers on stellar spectroscopy and other subjects.

HALE, Horatio, American ethnologist: b. Newport, N. H., 1817, May 3; d. Clinton, Ontario, 1896, Dec. 29.

He was a son of Sarah J. Hale. He was graduated from Harvard in 1837 and the next year was appointed philologist to the government exploring expedition under Captain Wilkes, and was thus enabled to study the languages of the Pacific Islands, North and South America, Australia, and Africa. The results of his observations were published in *Ethnography and Philology* (1846). He then studied law, was admitted to the Chicago bar, and removing to Canada in 1855 practised law at Clinton. His other works are: *Indian Migrations as Evidenced by Language* (1883); *The Iroquois Book of Rites* (1883); *A Report on Blackfoot Tribes* (1885). He was classed among the foremost philologists of his time and was a member of learned societies at home and abroad.

HALE, Irving, American soldier and electrician: b. North Bloomfield, N. Y., 1861, Aug. 28. He was graduated from the United States Military Academy in 1884, was assigned to the engineer corps, was instructor in engineering at the Military Academy in 1888–9, and in 1890 resigned from the army. He became manager of the General Electric Company for the district comprising Utah, Wyoming, Colorado, and New Mexico, with headquarters at Denver; upon the outbreak of the Spanish-American war was appointed colonel of the 1st regiment of Colorado volunteers, was promoted brigadier-general for distinguished service in the Philippines, and later brevetted major-general. In 1899 he was honorably discharged from the volunteer service. His writings include papers on electrical subjects in scientific and engineering journals and in the proceedings of the Colorado Scientific society.

HALE, John Parker: 1806, Mar. 31—1873, Nov. 19; b. Rochester, N. H.: statesman. He graduated at Bowdoin College 1827, was admitted to the bar at Dover, N. H., 1830, elected a member of the legislature as a democrat 1832, appointed by Pres. Jackson U. S. dist. attor. 1834, reappointed by Pres. Van Buren 1838, removed by Pres. Tyler 1841, elected representative in congress 1842, and U. S. senator 1846, 56, and 58, and appointed U. S. minister to Spain 1865. During his service in the lower house of congress he opposed the rule suppressing anti-slavery petitions, refused to support the scheme for the annexation of Tex., and was a member of the most important committees. In his 16 years of service in the senate he fought the slave power at every opportunity. He had oratorical gifts of high order, a clear, strong voice, a quick wit, and a large fund of humor, and impressed all hearers with a conviction of his deep sincerity. He declined the nomination of a National Liberty convention for pres. 1847, secured the abolition of flogging in the navy 1850, and of the spirit-ration 1862; was the free-soil party's candidate for president, with George W. Julian for vice-pres., and

received 157,685 votes 1852; and was one of the victims of the National Hotel poisoning, from the effects of which he never wholly recovered.

HALE, Sir MATTHEW, Lord Chief-Justice of England: 1609, Nov. 1—1676, Dec. 25; b. Alderley, Gloucestershire. In his fifth year, his parents died, and he was brought up by a kinsman of strict Puritan principles, and intended for the ministry. He was sent to Oxford University at the age of 16, and was of studious disposition till a company of strolling-players visited that seat of learning, when the long pent-up passions of youth were suddenly let loose, and in this vagrant company he gave way to dissipation, and at last was about to enter the army. But just at that time he became involved in a litigation about his patrimonial estate, and went to London to consult Serjeant Glanvil, a leading lawyer. The serjeant turned young Hale's ambition into a new direction; and ultimately, 1629, Hale entered the Society of Lincoln's Inn, and was in due course called to the bar. When the long parliament began he had much repute; and having cautiously refrained from committing himself to either of the great parties, both sought to enlist his service. But he declared for neutrality—conduct which Lord Campbell pronounces cowardly and selfish, but which is almost universally deemed to have been the result of a sincere desire for the public good, and the conscientious dictate of his estimation of the duty proper to a jurist. When, however, the parliament triumphed, Hale signed the Solemn League and Covenant, and sat in the assembly of divines at Westminster, faithfully tried to bring about a settlement between the king and parliament, and failing, ultimately took his engagement to the Commonwealth, and was made a judge under Cromwell 153, having overcome his natural scruples about serving a usurper, on the plea of necessity. The utterly irrational course of the king, and the evident sagacity and sincerity of Cromwell, may well have convinced him of the hopelessness at that time of any public benefit from the kingly government. He acted as a *puisne* judge of the common pleas till Cromwell's death, but refused to have his commission renewed by Richard Cromwell, and then entered parliament. On the restoration, he was graciously received by Charles II., and was made chief baron of the court of exchequer; and after 11 years, was transferred to the chief-justiceship of the court of queen's bench. He was reckoned the best judge of his time, being acute, learned, and sensible; and he ever set his face against bribery, one of the vices of the age. John Bunyan was brought before him, and convicted of frequenting conventicles; and when Bunyan's wife afterward moved for her husband's discharge, she was politely dismissed without redress. It is his reproach, which the unenlightened age must share with him that he also

sentenced some women convicted of witchcraft, to be executed, avowing his full faith in the delusion of the best minds of that age, that witchcraft was a grave and dangerous offense. During his career as a judge, Hale led an austere and scholarly life, leaning to the side of the Puritans. He made a friend of Richard Baxter, and was very serious and earnest in his religious views, and strictly pure in morals. His private diaries and papers show the elevation of his character. He wrote some legal works, which are still of the highest authority, and he bequeathed several valuable legal MSS. to Lincoln's Inn, which are still treasured there. He resigned his office from ill health 1676, and died on Christmas-day of that year.

HALE, NATHAN, American revolutionary officer: b. Coventry, Conn., 1755, June 6; d. New York, 1776, Sept. 22. He was graduated at Yale in 1773, and engaged as a teacher, first at East Haddam, and afterward at New London. His parents intended him for the ministry; but on the Lexington alarm in 1775 he wrote to his father, in a Connecticut regiment, saying 'that a sense of duty urged him to sacrifice everything for his country,' and soon after entered the army as lieutenant (1775) and in a few months was promoted to be captain (1776). While with the troops near Boston he was vigilant and faithful in every point of duty; and according to a tradition of doubtful authenticity, in September 1776, when in New York, he, with an associate, planned and effected the capture of a British sloop laden with provisions, taking her at midnight from under the guns of the man-of-war Asia, and distributing her prize goods to the American soldiers. After the retreat of the army from Long Island, when it was all-important to understand the plans of the enemy, Washington applied for a discreet and practised officer to enter the enemy's lines and procure intelligence, and Hale volunteered for the service. He passed in the disguise of a Dutch schoolmaster to the British camp and made full drawings and memoranda of all the desired information, but on his return was apprehended and taken before Howe, by whom he was ordered to execution the next morning. He was denied a Bible and the aid of a clergyman; and was hanged, saying with his last breath: 'I only regret that I have but one life to lose for my country.' A statue of Hale is in City Hall Park, New York. Consult the *Life* by Johnston (1901); Holloway, *Nathan Hale, the Martyr Hero* (1899).

HALE, NATHAN, American journalist: b. West Hampton, Mass., 1784, Aug. 16; d. Brookline, Mass., 1863, Feb. 9. He was a nephew of the patriot Nathan Hale (q.v.) and father of E. E. Hale (q.v.). He was graduated from Williams College in 1804, and after studying law was admitted to the Boston bar in 1810, in 1811–4 was editor of the Boston *Weekly Messenger*, and in 1814

purchased and became editor of the *Advertiser*, established in 1813 and the first New England daily. At first Federalist in politics, the *Advertiser* became successively Whig and Republican and was at all times very influential. In 1820 it opposed the Missouri bill, in 1854 the Kansas-Nebraska bill, and it was the first newspaper to advocate the settlement of Kansas by 'Free-Soil' colonists. Hale was a founder of the *North American Review* (1815), served at various times in both houses of the Massachusetts legislature, published a series of stereotyped maps after a method invented by himself (1830), and wrote pamphlets on topics of internal improvement.

HALE, Philip, American music critic: b. Norwich, Vt., 1854, March 5. Graduated from Yale in 1876, he was admitted to the bar in Albany (1880), studied music under Dudley Buck and later in Europe with Haupt, Bargiel, and Guilmant (1885–7), and was organist successively of Saint Peter's, Albany (1879–82), Saint John's, Troy (1887–9), and the First Unitarian Society of Roxbury, Mass. (1889). In 1889–97 he contributed music criticism to the Boston press, from 1891–1903 was critic of the *Journal*, editor of the *Musical Record*, (1897–1901), of the *Musical World* (1901–3), since 1901 has been editor of the Boston Symphony Program Books, and since 1903, May, musical critic of the Boston *Herald*. He is known as one of the most discriminating and interesting of American writers on musical subjects.

HALES, Alexander of: see Alexander of Hales.

HALES, *hālz*, John ('the ever-memorable Mr. John Hales of Eton'), 1584–1656, May 19; b. Bath, England. He was educated at Corpus Christi College, becoming fellow of Merton and prof. of Greek at Oxford, and resident fellow of Eton. In 1618 he went to the Hague as chaplain to the British ambassador; and was present at the Synod of Dort to report proceedings. The unchristian passion and contentious zeal of extreme orthodoxy led him to see how little dogmatic precision has to do with spiritual truth, and how hopeless it is to confine this truth under definite creeds and systems of human device; and he 'bid John Calvin good-night.' He returned to England 1619, and settled at Eton in studious seclusion. His *Tract concerning Schism and Schismatics* brought him under the displeasure of Laud, who however was satisfied on a personal conference, and appointed him to a canonry at Windsor. During the Puritan supremacy he was driven from his office and reduced to great poverty. Hales' *Golden Remains* appeared 1659; the best ed. was published at Glasgow, 3 vols., 1750. As one of the *Latitudinarians* (q.v.), Hales is discussed by Tulloch in his *Rational Theology* (1872).

HALES, Stephen: 1677, Sep. 7—1761, Jan. 4; b. Beckesbeurn, in Kent: English natural philosopher. He entered Bene't (now known as Corpus Christi) College, Cambridge, 1696; was elected fellow 1702, and having taken holy orders, was presented about 1710 to the perpetual curacy of Teddington, Middlesex, where the remainder of his life seems to have been spent.

His first important publication was *Vegetable Statieks, or an Account of some Statical Experiments on the Sap of Vegetables* (1727), which rapidly acquired such reputation as to be translated into English, French, Dutch, and Italian, and which may be considered the starting point of our true knowledge of vegetable physiology. A second part of this work, under the title *Hæmastaticks*, and treating of the circulation of the blood, appeared 1733. Besides independent works, he contributed numerous memoirs to the *Philosophical Transactions* on ventilation, on the methods of keeping water fresh, on electricity, on the analysis of the air, etc. His ventilating machines were introduced into the London prisons, and were found most efficacious in diminishing mortality among the prisoners. His system was adopted in France with similar good results. His improvements in the mode of collecting gases did much to facilitate the subsequent labors of Black, Priestley, and Lavoisier.

HALÉVY, *â-lā-vē'* Jacques François Fromental: 1799, May 27—1862, Mar. 17; b. Paris, of Jewish parentage: French musical composer. He studied under Berton and Cherubini, and afterward at Rome. The first work that brought him any considerable reputation was *La Juive*, produced at the Grand Opéra 1835. The most important of his subsequent pieces (of a serious character) were—*La Reine de Chypre*, *Charles VI.*, *Le Juif Errant*, and *La Magicienne*. Those for the Opéra Comique are regarded as most successful; the principal are—*Les Mousquetaires* (probably his masterpiece), *L'Eclaire* and *Le Val d'Andorre*. He was a great favorite with his countrymen; but his style was so purely national, that, in spite of his great dramatic power, he did not have great celebrity out of France.

HALÉVY, Joseph, French Orientalist and traveler: b. Adrianople, Turkey, 1827, Dec. 15. In 1868 he traveled in Abyssinia; and for the Académie des Inscriptions he traversed (1869–70) Yemen, where he obtained copies of not less than 686 inscriptions, largely Himyaretic and Sabæan. He was appointed assistant librarian of the Asiatic Society, and adjunct-professor of Ethiopic in the Ecole des Hautes Etudes. Well known also as a Biblical critic and Assyriologist, he founded (1893) the *Revue Sémitique d'épigraphie et d'histoire ancienne*, and published numerous works, including: *Archæologic Mission to Yemen* (1872); *Journey to Nedjran* (1873); *Sabæan Studies* (1875); *The Origin of Babylonian Civilization* (1876); *Miscellany of Criticism and History Regarding Semitic Peoples* (1883).

HALÉVY, Ludovic, French dramatist and novelist: b. Paris, France, 1834, Jan. 1. He is a nephew of J. Halévy (q.v.) and, unsuccessful at first, he finally worked his way into public favor, especially after associating his pen with that of Henri Meilhac. In collaboration with the latter, he wrote many of the librettos of Offenbach's most brilliant and satiric operettas, including *The Perichole*, *The Brigands*, the *Belle Helene*, and *The Grand Duchess of Gerolstein*. Several serious librettos of high excellence are from the same hands, including that for Bizet's *Carmen*. In spoken drama, *Frou-Frou* and *Tricoche and Cacolet* are among the most popular plays the two dramatists produced together. In 1881 he ceased writing for the stage, and turned to fiction. *L'Abbé Constantin*, the first of his novels, is also the most popular, and opened to him the French Academy. It was for more than one season the French story of the day. It is a charming story, full of fresh air and sun, simply and skilfully told. It presented a view of American character and temperament not usual in French fiction; and irreproachable in its moral tone, has become a sort of classic for American schools and colleges. *La Famille Cardinal* (The Cardinal Family) and *Crichette* are studies in fiction of aspects of Parisian life. *Notes and Souvenirs* embody observations during the Prussian invasion of 1871. They are interesting, as giving faithful pictures of the temper of the people during those days. Among his short stories, *Un Mariage d'Amour* (A Marriage for Love) is one of the best.

HALF, n. *hâf*, Halves, n. plu. *hâvz* [Goth. *halbs*, half: Icel. *halfa*, a part, side: Sw. *half*, half: Swiss, *halb*, the side of a body]: one portion of a thing divided into two equal parts: Adj. in an equal part or degree: Ad. in part: equally; very much, as half-starved. Halfness, n. *hâf'-nĕs*, the state of being divided in opinions; in a state of uncertainty or half-heartedness. Half-and-half, a mixture of porter and ale or beer, in about equal portions. Half boarder, only a day-boarder at a school. Half-bound, having only the back and the corners of leather, as a book. Half-blood, relationship between persons born of either the same father or mother, but not of both: such persons are related through only one parent. When two persons have the same father, but not the same mother, they are called brothers or brother and sister consanguinean; when they have the same mother only, they are called brothers, etc., uterine. In the succession to real or landed property in England, the half-blood relations by the father's side succeed after the full-blood relations; and next, but at a considerable interval, the half-blood relations by the mother's side. Half-breed or -bred, of a mixed race; a mongrel; a race-horse not pure blooded. Half-brother or sister, related by one parent only. Half-cap, in *OE.*

a cap but partially put off or doffed. HALF-CASTE, a cross, as between a European and a Hindu. HALF-COCK, raised only half-way, as the hammer of a gun: N. the position of being half raised. HALF-DEAD, almost dead; very much exhausted. HALF-FACED, *-fāst*, in *OE.*, showing only part of the face; small-faced—usually in contempt. HALF-FARTHING, the smallest British copper coin, in value the eighth part of a penny—not now in circulation; a mite. HALF-MEASURES, not full and complete endeavors or steps to accomplish the end in view. HALF-MOON, the moon when half the disk appears illuminated; anything like it. HALF-PIKE, a boarding-pike used in ships. HALF-ROUND, a semicircular molding. HALF-SEAS-OVER, half-drunk. HALF-STUFF, in manufacturing anything, half-formed material; a partially prepared pulp in paper-making. HALF-SWORD, in *OE.*, a close fight with swords, as it were at the distance of half a sword-length. HALF-TINT, an intermediate tint. HALF-WAY, midway; equidistant from the extremes. HALF-WITTED, *-wĭt'ĕd*, weak in intellect; silly.

HALF-DOLLAR: a silver coin of the United States of the value of 50 cents. Authorized in 1792, April, its coinage at a weight of 208 grains was begun in 1794; its issue was suspended from 1798 to 1800 inclusive and in 1816. In 1853 its weight was reduced to 192 grains. The half-dollar is legal tender to the amount of ten dollars.

HALF-EAGLE: a gold coin of the United States of the value of five dollars, so called from the national emblematic bird which figures upon the reverse. Authorized in 1792 the coinage was begun in 1795, July; there was no issue in 1816 and 1817.

HALF-KING: the name given by the English to a Seneca Indian, chieftain of an Ohio tribe, who accompanied Washington during his expeditions in 1753–54, and was present at the defeat of the French at Great Meadows. His summary of the prowess of the respective combatants was that 'the English acted like fools and the French like cowards.'

HALF-TONES: pictures produced by printing from plates made by the half-tone process, which will here be described. Except that used in line-drawing, until early in the eighties there was no process by which paintings, wash-drawings, or photographs could be done into the form of a surface printing-block for the press, and the introduction then of the half-tone block marked a revolution in the history of photographic illustration. The development of the process was the result of a kind of evolution of Bullock's (1866). Meisenbach of Munich patented a half-tone process in 1882.

The American Frederic Eugene Ives and others have since experimented and published results, and by them within a few years the process as it now exists was

practically established. Americans were first in the field with an improved device for breaking up the image into dots, which was so much superior to anything invented in Europe that almost every other method was dropped in its favor. The diamond-ruled screen, which was introduced in this country by Max Levy, is essential to advanced work in half-tone. To make one of the screens, a sheet of the finest plate-glass is coated with a varnish of asphalt and wax, and placed on the bed of an automatic ruling-machine capable of ruling lines of any fineness up to 500 to the inch. The cutter is diamond-pointed and gauged to cut lines of any desired width. The lines are ruled diagonally at 45° across the glass, the number to the inch varying as required. The ruled surface is treated with hydrofluoric acid, which eats into or etches the lines laid bare by the diamond and forms a channel which is filled up with an opaque pigment. This enamel is baked in the lines in an oven, and then the surface is polished until the lines are perfectly level and the spaces represented by the clear glass are bright and transparent. Two of these ruled glasses are required for each screen, laid together with the lines crossing at right angles and cemented with Canada balsam.

To produce a half-tone block from a picture, wash-drawing, or photograph, this ruled grating is placed in front of the sensitive plate, not in contact with it, but at a distance which must be nicely determined by experience. Everything is represented by dots so accurately graded in relation to the light and shade of the original that the eye scarcely detects them, and the half-tone picture appears as a practical *facsimile* of the original from which it was photographed.

Most half-tone blocks are now etched on copper, and the sensitizing solution generally employed for this metal is a compound of fish-glue, albumen, chromic acid, water, and bichromate of ammonia. The copper is cleaned with tripoli and washed; the sensitizing solution is flowed over it two or three times; it is placed on a revolving table and rapidly whirled to spread the coating thinly and evenly; the coating is dried by gentle heat in a yellow-lighted room, and the plate is now ready for exposure under the half-tone negative. Three to ten minutes exposure to an electric arc-light completes the printing, then the plate is given a bath in cold water, and is soaked and washed under a spray of water until the compound not acted upon is dissolved out. The image on the metal at this stage is almost invisible. To facilitate an examination of the film, the plate is dipped into a solution of methyl-violet, which stains the film and brings the picture into view. If all is right, the surface is dried either by flowing with methylated alcohol or by gentle heat. The next operation is the hardening of the glue-picture into

a substance resembling enamel—hence the 'enameline process.' The plate is highly heated over the flame of a large Bunsen burner; during the progress of this 'burning in' or enameling, the blue picture gets pale, then gray, and vanishes; as the plate gets hotter, the image appears as a faint brown, and increases in strength to a rich chestnut-brown tint, when the heat must be withdrawn, and the plate cooled off. The plate has now upon it a picture formed of a strong, hard, impermeable coat of enamel which will bear any reasonable etching without further protection.

The etching-bath is made up of neutral perchloride of iron dissolved in water, and of a strength which registers 35° with a Baumé's hydrometer. The plate is first subjected to a general etching, so that it may be inked over with a printer's roller, and a first proof of the photo-etched picture be pulled in the press. The dulling of the general effect caused by the interposition of the necessary screen-grating has to be removed as far as possible, and this is done by artists who are specially trained for the work. The parts of the picture which are in shadow and are usually correctly rendered by a properly exposed negative are covered over with varnish, and the next tones are etched again; then these tones are covered up and the high lights are treated until the resulting picture, when proofed, correctly represents the original. The plates are then trimmed by engravers, beveled to admit of being riveted to the wood-mounts, and are mounted type-high for use in the printing-press.

Invention and experiment are now active toward the next great step in half-tone work, the production of surfaces without the mechanical smoothness hitherto so persistent. What is aimed at is the making of pictures which are free from mechanical effect, and are yet sufficiently delicate in texture to retain the finer details.

HALF-WAY COVENANT: an ecclesiastical compromise prevailing in the New England churches, during the earlier part of the 18th c. After the Protestant reformation the strictest Puritans adopted the theory that the visible church on earth should consist only of regenerate persons, and consequently must seek to discern whether an applicant for admission is a true follower of Christ. This view was brought to New England by the first colonists, who taught, however, that a severe examination should be avoided, and that the weakest faith, if genuine, should be accepted as sufficient for admission to the church; because such a weak faith most needs the fellowship of the church that it may grow strong. The baptized children of church members, too, were recognized as being members, but not in full communion, which could be attained only on personal profession of repentance and faith.

But these strict conditions soon became unpopular, the clergy being the chief advocates of more liberal terms. At length, while the principle of a regenerated membership was not abandoned, a compromise was effected by which baptized persons, orthodox in doctrinal belief and correct in life, upon making with the church a covenant which involved something less than a profession of repentance and faith and was therefore called 'the half-way covenant', were allowed to have their children baptized and even to come themselves to the table of the Lord. The latter part of the change was effected chiefly through the influence of Mr. Solomon Stoddard, for many years the venerated pastor at Northampton, Mass. Believing that the Lord's Supper was instituted as a means of regeneration and that, consequently, the unregenerate who had a general sympathy with the church ought to partake of it, he drew up a short profession for such persons to make in order to be admitted to the communion. Though at first opposed, the plan gradually prevailed among the ministers and people of that region and elsewhere in New England. When Jonathan Edwards (q.v.), grandson of Mr. Stoddard, became his colleague and successor, he continued to practice the plan for 20 years; but becoming convinced that it was unscriptural he renounced it. This produced a violent commotion and, with other influences, effected the severance of his pastoral relation (1750). The great awakening which afterward occurred under the preaching of Edwards, Whitfield, and others, introducing a higher spiritual tone into the life of the church in New England, ultimately brought about the abandonment of the half-way covenant. A similar plan, based on somewhat different principles, was for a long time in use among Presbyterian churches.

HALIAETUS, n. *hăl-ĭ-ā'ē-tŭs* [Gr. *hals, halos*, the sea; *aetos, œetos*, an eagle]: sea-eagle, genus of *Falconidœ*, sub-family *Aquilinœ*. *H. leucocephalus* is the bald-eagle or the white-headed eagle, the chosen symbol of the United States.

HALIBURTON, *hăl'ĭ-bėr-ton*, Thomas Chandler, D.C.L.: colonial ex-judge, author, and politician: 1796—1865, Aug.; b. Windsor, Nova Scotia; son of the Hon. Mr. Justice Haliburton of Nova Scotia; descended from an ancient Scottish family. Haliburton received his education at King's College, in Nova Scotia, afterward practiced as a barrister, and became a member of the house of assembly. He was raised to the bench of the common pleas of the colony 1829, and 1840 became judge of the supreme court. In 1850 he retired from the bench, and went to reside in England. In 1858 he received the degree D.C.L. from the University of Oxford, and 1859 took his seat on the conservative benches of the house of commons as M.P. for Launceston, which he represented until his death. Haliburton is best known as the author

of *The Clockmaker, or Sayings and Doings of Samuel Slick of Slickville* (1837)—picturing 'Sam Slick' as a Yankee clockmaker and pedler, whose quaint drollery, unsophisticated wit, knowledge of human nature, and aptitude in the use of what he calls 'soft sawder,' have given him a chance of immortality: a second series followed 1838, a third 1840. Subsequently the author brings 'Sam Slick' to England as an attaché of the U. S. legation, and is thus enabled to offer many shrewd and humorous observations on the aspects of British society, especially in regard to the upper classes and their pampered servants: this was followed by another series 1844. *Sam Slick* has been almost universally read in the United States, where its extravagances are keenly relished. It has had wide popularity in England, and has been translated into many continental languages. Haliburton was author also of the *Letter-bag of the Great Western, Wise Saws and Modern Instances, Nature and Human Nature, Bubbles of Canada, Rule and Misrule of the English in America,* and *A History of Nova Scotia.* Judge Haliburton attained a place and fame difficult to acquire at all times—that of a man of serious avocation, whose humor was nurtured in one country, and became naturalized, in another; for humor is the least exotic of the gifts of genius.

HALIBUT, n. *hăl'-ĭ-bŭt* (in Britain sometimes HOLIBUT) [Dut. *heil-bot*—from *heil*, holy; *bot*, as in *bot-visch*, a flat-fish], (*Hippoglossus vulgaris*): one of the largest of flat-fish (*Pleuronectidœ*); in form more elongated than the flounder or the turbot, the eyes on the right side, the upper surface smooth and covered with small, soft, oval scales, the color brown of different shades: the under surface perfectly smooth and white. The Halibut, though esteemed for the table, is not to be compared in quality with turbot; its flesh is white and firm, but dry, and has little flavor. The name Holibut, Halibut, was given because the fish was deemed good eating for 'holy-days,' i.e., days appointed by the Church for abstinence from meat. The Halibut is more abundant in the north than in the south; and great numbers are taken by the Orkney fishermen. It is not found in the Baltic, but is plentiful on the coasts of Norway, Iceland, and Greenland; and large quantities are taken on the northern parts of the American Atlantic coast. It is of great value to the Greenlanders, who preserve it for winter use by cutting it into long slips and drying it in the air. Oil is obtained from it in considerable abundance. It attains a great size; specimens have been caught weighing nearly 500 pounds. Other species of the same genus occur in the seas of other parts of the world.

HALICARNASSUS, *hăl-ĭ-kâr-năs'sus* (originally *Zephyria*): ancient Greek city, on the s.w. coast of Asia Minor, on the Ceramic Gulf or Gulf of Cos; founded on a picturesque site by a colony from Trœzene. It was one so-called Doric Hexapolis of the cities from which con-

federacy, however, it was eventually excluded. H. was the largest and most powerful of the cities of Caria, and, by its situation and the inaccessible position of its citadel, was reputed a place of great strength; but the people, owing to the enervating influence of the climate, were weak and effeminate, and during the Persian conquests, readily yielded to the dominion of the conquerors. During this peorid (about B. C. 500), a domestic tyrant, Lygdamis, rose to supreme power, as a vassal of Persia; and under his descendants, the city, without forfeiting the Greek character or ceasing to cultivate the Greek literature and arts, remained faithful to the Persian interest. Artemisia, daughter and successor of Lygdamis, actually commanded a naval squadron in the fleet of Xerxes, at the battle of Salamis. Alexander the Great, provoked by the obstinacy with which the city held out against him, commanded that it should be destroyed by fire; but the inhabitants took refuge in the citadel, which successfully resisted his arms. The city was afterward rebuilt, but never recovered its ancient importance or prosperity. In the days of the Roman Empire, it had sunk into comparative political insignificance, its only title to consideration at that time being the celebrated Mausoleum, erected in memory of one of the rulers, named Mausolus, by his sister (who had been also his wife and successor) Artemisia. H. was the birthplace of two of the most eminent Greek historians, Herodotus and Dionysius. The site is occupied by the modern Boudroum. For an account of the discovery of the ancient remains of the city, and of the disentombment of the Mausoleum, see MAUSOLEUM.

HALIC'ORE: see DUGONG.

HALICTUS, n. *ha-lĭk'tŭs:* genus of solitary bees, family *Andrenidæ;* found both in America and Europe.

HALIDOM, n. *hăl'ĭ-dŏm* [Icel. *heilagr-dómr*—from *heilagr*, holy; *dómr*, doom or judgment]: in *OE.*, things of especial holiness; the relics of the saints on which oaths were formerly taken; holiness; sanctity; holy state.

HALIEUTICS, n. *hă-lĭ-ū'tĭks* [Gr. *halieutika*—from *halieus*, a fisherman]: treatise on fishes or the art of fishing; ichthyology.

HALIFAX, *hăl'é-făks*: city and port of entry, Canada, capital of Nova Scotia and county seat of Halifax County; on the s. e. or outer coast of the peninsula and on the lines of the Intercolonial and Dominion and Canadian Pacific railways, lat. 44° 39′ n., and long. 63° 37′ w. There are also steamship connection with Great Britain, the West Indies, Boston, and New York.

Topography.—H. is an important military post and strongly defended by 11 forts and batteries; is the chief naval station of British N. America; is the principal e. terminus of Canadian railways; and is an important cable station. The harbor is one of the finest in the world. It is entered from the s., extends n. about 16 m., and terminates in a magnificent sheet of water called Bedford

VIEW OF HALIFAX FROM THE CITADEL.

Basin; it is spacious enough for the entire navy of England, and offers all the year round easy access and safe anchorage to vessels of any size. The harbor has two entrances, separated by M'Nab's Island, of which the western only is navigable for vessels of large tonnage. H., with its suburbs, extends along the slope of a hill, crowning which is a citadel and is over two miles in length, and about three-quarters of a mile in width. The streets are well laid out, at right angles; and handsome granite and free-stone have superseded wood. The dockyard, covering 14 acres, is one of the finest in the British colonies; and at the beginning of 1907 was handed over to the Dominion by the Imperial Government.

Public Works, Buildings, Churches, Etc.—The streets are lighted by gas and electricity; there is an excellent system of electric street railways; the city maintains a free library and an excellent waterworks system; and the parks include Point Pleasant Park and the public gardens covering 17 acres. The principal edifices are the Province Building (which contains the govt. offices), the new Custom House and the Post Office, Dalhousie College, Government House, military hospital, Admiralty house, the school for the blind, the institution for deaf and dumb, the hospital for the insane, penitentiary, court-house, city hall, the Masonic Temple, Academy of Music, Wellington barracks, numerous hotels, theatres, work-house, jail, etc. H. contains about 50 churches, chief of which are the Roman Catholic cathedral, and St. Paul's church, the oldest Protestant church building in British North America. Beside the public and high schools there are several institutions for higher education, notably Dalhousie University and College (non-sect.), the College of St. Mary (Rom. Cath.), the Halifax Medical College, the Presbyterian Theological College and the Halifax Ladies' College and Conservatory of Music.

Industry, Commerce, and Finance.—The principal manufactures are boots and shoes, clothing, cotton and woolen goods, iron castings, agricultural implements, machinery, nails, paints, cordage, leather, woodenware, soap and candles and gunpowder. There are also breweries and distilleries and sugar refineries. The fisheries are a source of considerable income. The exports consist chiefly of agricultural products, lumber and fish; the imports are sub-tropical products, sugar, molasses, rum, etc. The city has considerable trade with the West Indies, and the bulk of commerce for the entire province is carried on through H. Imports (1904) were $8,466,060 and the exports $8,955,183. In 1906 shipping was represented as follows: vessels cleared and entered, foreign, 3,372 of 1,761,702 tons, coasting 7,894 of 1,278,872 tons; total, 11,266 vessels of 3,040,574 tons. The assessed valuation of taxable property was $27,030,050, city debt $3,687,690, including cost of water supply and school buildings. There are 5 local banks, beside branches of the Bank of British North America, and the Bank of Montreal.

Government and History.—The government is vested in a mayor, elected annually and a board of 18 aldermen elected triennially. The city and county send three members to the Provincial legislature and two to the Canadian House of Commons. H. was founded 1749 by Col. Edward Cornwallis, and named in honor of the Earl of Halifax who was instrumental in fitting out the expedition for founding the city. Though it was founded so late, yet so favorably was it situated that it supplanted Annapolis as the seat of government. The city became a free port 1817, and received a city charter 1842. Pop. (1871) 29,582; (1881) 36,100; (1901) 40,832; (1907) about 45,000 with about 10,000 more in the suburbs.

HAL'IFAX: thriving market-town, municipal and parliamentary borough of England, in the West Riding of Yorkshire, on the river Hebble, a feeder of the Calder, on the slope of an eminence; 43 m. s.w. of York, 217 m. n.n.w. of London. The varied ecclesiastical architecture of H. strikes every visitor. The parish church of St. John, restored 1879, and Trinity church, are fine specimens of Gothic; 'All Souls,' from designs by Sir G. G. Scott, is one of the best and most elaborate of all the churches of which he is the architect. The 'Square Church,' Congregational, was erected 1863. The town-hall, opened 1863, is very ornate. Other important buildings are the Piece Hall, erected 1779, for the reception and sale of manufactured goods, now used as a market for fish and vegetables; the assembly-rooms, Mechanics' Institute, and theatre. Among the numerous public and private educational institutions are the Heath Grammar School, founded 1585, and the Blue Coat School. The Crossley Orphan Home and School was built by the Crossley brothers at a cost of £46,000. H. has three parks—Savile, Shrogg's and the People's Park, the last the gift of the late Sir F. Crossley. Crossley's carpet-works employ more than 3,000 hands. The manufactured goods, besides carpets are chiefly shalloons, tammies, calamancos, duroys, everlastings, moreens, shags, serges, merinos, as well as baises, narrow and broad cloths, kersevmeres, and bombazins. Cotton fabrics, wool-cards, and paper are mftd. There is some trade in corn, in iron, chemicals, and mill-machinery, and in raising coal and slate. Pop. (1901) 104,997.

A barbarous old local law long ago discarded, known as the Halifax Gibbet Law, was enacted here at an early period of the woolen manufacture, for protection of manufacturers against the thievish propensities of their hands, who were in the habit of robbing their employers, by keeping themselves a portion of the material which ought to have gone into the cloth, so that when manufactured, the fabric was of inferior weight and body. The Gibbet Law provided that all persons within a certain circuit, who had stolen property of or above the value of 13½*d.*, were to be tried by the frithburghers within the liberty, and if found guilty, were handed over to the magistrates for pun-

ishment, and were put to death on the first market-day following by means of an instrument similar to the guillotine. The platform of stones on which the Halifax gibbet stood, and where executions took place, is still seen on the w. side of the town.

HALIFAX, CHARLES MONTAGUE, Earl of: poet and statesman: 1661, Apr. 16—1715, May 19; b. Horton, Northamptonshire, England; grandson of Henry, first Earl of Manchester, and nephew of the famous parliamentary general. He was educated at Westminster School and Trinity College, Cambridge. A laudatory poem on Charles II. first brought Montague into public notice. Two years later appeared the parody on Dryden's *Hind and Panther*, entitled *The Town and Country Mouse*, of which he was joint author with Matthew Prior; but his poetry would hardly have made his name remembered in the 19th c. He almost disappeared from the field of literature after the appearance of his satire, save as the patron of Addison and other men of letters. He had intended to enter the priesthood, as it afforded a regular income, but tempted by the offer of a seat in the house of commons, he became member for Maiden in the convention parliament, where he voted for the declaration that James II. had abdicated, and that the throne was thereby vacant. He retained his seat in William III.'s first parliament, and was appointed 1692 a commissioner of the treasury. Dec. 15 in that year he proposed, in the house of commons, to raise a million sterling as a loan. William required money for his wars—the moneyed classes were tired of bubble companies, and know not where to invest safely, and the landowners were weary of heavy taxation; so the National Debt was established. (See NATIONAL DEBT.) In the spring of 1694, money was again wanted, and Montague was ready to supply it. This time he did so by originating a national bank, for which a scheme had been laid before the govt. by William Paterson three years previously. The capital was to be £1,200,000, and the shareholders were to be called the Governor and Company of the Bank of England. The bill for this was ultimately passed; the result was immensely successful, and Montague became chancellor of the exchequer. His next work was the recoinage of 1695, which he carried out successfully, appointing Newton warden of the mint, and raising tax on windows to pay the expense, instead of the obnoxious impost called hearth-money. The interval between the last day on which the old money was receivable in payment of taxes, and the issue of the new coin, was, owing to the absence of a circulating medium, likely to cause much distress; but he obviated this by establishing exchequer bills bearing interest daily, and ranging in amount from £5 to £500. On Godolphin's resignation 1697, he became premier, but soon becoming unpopular, was obliged

to bestow upon himself the auditorship of the exchequer, and resign his higher offices. Harley insisted on his withdrawal from the commons, and he became Baron Halifax, adopting a title which had just become extinct. He was impeached before the house of lords for breach of trust 1701, and again 1703, but the proceedings fell to the ground. During the whole of Anne's reign, Halifax remained out of office, but was active in promoting the union with Scotland and the Hanoverian succession. On the queen's death, he was naturally appointed a member of the council of regency, and on George I.'s arrival, became an earl and prime minister. His rule was ended by death, after nine months. Halifax, though arrogant and mean and fond of display, was a consistent politician, and one of the greatest financiers of his time.

HALIFAX, *hăl'ė-făks*, GEORGE SAVILE, Marquis of: about 1630—1695, Apr. 20; b. Yorkshire, England: statesman. He was active in the Restoration, became Baron Savile and Viscount Halifax 1667, privy councilor 1672, member of the 'council of 30,' and earl 1679, and marquis of Halifax 1682. He was one of the 4 confidential advisers of Charles II., secured by his eloquence the rejection in the house of lords of the bill excluding the Duke of York from the succession 1680, defended Lord Russell, opposed the withdrawal of the Mass. charter, was appointed speaker of the house of lords, advocated the claims of William as king regnant, presented the crown to William and Mary on their accession, and became prime minister under them. On the accession of James he was transferred from the office of lord privy seal to that of pres. of the council, and on refusing to vote for the repeal either of the 'test' or the 'habeas corpus' acts was dismissed from the cabinet 1685. Subsequently he espoused the cause of William of Orange, was speaker of the house of lords in the 'convention parliament,' became lord privy seal under William, resigned his office and joined the opposition, and eventually returned to the support of the govt. He became leader of the party called 'trimmers,' and published many works, including *The Anatomy of an Equivalent, The Character of a Trimmer, Maxims of State Applicable to all Times, A Seasonable Address to both Houses of Parliament, Cautions for Choice of Parliament Men, Observations upon the Reigns of Edwards I., II., III., and Richard II.*, and *Character of King Charles the Second.*

HALIFAX RIVER: tidal channel in Volusia co., Fla.; known also as Mosquito North Lagoon. It communicates with the sea through Mosquito Inlet, extends 30 m. n. and inland with an average width of 1 m., is continuous southward with the Hillsborough river, is navigable, and abounds in oysters and fish.

HALIOGRAPHY, n. *hăl'ĭ-ŏg'ră-fĭ* [Gr. *hals*, the sea; *graphō*, I write]: a description of the sea.

HALIOTIS, *hăl-ĭ-ō'tĭs:* genus of gasteropodous mollusks, type of a family, *Haliotidæ;* belonging to the order *Scutibranchiata*, and having a widely ear-shaped shell, with a very low spire, and a row of holes not far from the opposite margin, over the fissure of the mantle, through which the water gains access to the gill-cavity. The holes are closed as the animal grows, and new ones formed, which first appear as notches along the margin of the shell. The animal, in a living state, exhibits great beauty of colors. It adheres to rocks by a large muscular foot, after the manner of limpets. One species, *H. tuberculata*, is common on the s. European coasts. It is used for food; the shell also is sought for an ornament, and for the Nacre (q.v.) in which it abounds, which is much used for mother-of-pearl ornaments, and particularly for ornamenting papier-maché articles. The shells of this genus are called *Ear-shells* or *Sea Ears.* They are the *Ormers* of the French. The species are very numerous; the most splendid are natives of warm climates.

HALITE, n. *hā'līt:* name given by Dana to common salt.

HALITHERIUM, n. *hăl'ĭ-thē'rĭ-ŭm* [Gr. *hals*, the sea; *thērĭŏn*, a wild beast]: in *geol.*, a tertiary sirenian having evident affinities to the *sea-cows.*

HALITUS, n. *hăl'ĭ-tŭs* [L. *hālĭtus*, breath—fr. *hālō*, I breathe]: a breathing; the vapor from new-drawn blood.

HALL, n. *hawl* [AS. *heal;* Dut. *hal;* Icel. *hal* or *höll*, the principal building of a king's or great chieftain's dwelling: AS. *helan*, to conceal: It. *sala;* F. *salle*, a house, a residence—*lit.*, a cover or place of shelter]: a very large room for public assemblies, etc.; a large room at the entrance of a mansion-house or palace; a court-house; the name often given to the country residence of a nobleman or gentleman; the place of meeting and business of a corporation: in *English universities*, a small group of students, agreeing to live together in a hired house, under supervision of the univ. officials. Anciently the halls were very numerous; 500 were in Oxford when the colleges numbered but three. At the beginning of the 15th c., the halls had fallen to 55, and the endowed colleges had increased to 12. Now the halls are almost discarded: very few remain. The term, however, is applied to certain endowed colleges also. HALL-MARK, in *England*, the stamp affixed by the Goldsmiths' Co. (q.v.), and certain assay officers, to gold and silver articles, as a warrant of their quality.—SYN. of 'hall': vestibule; court; entry; porch; passage; room; edifice; college.

HALL: large principal apartment of the castles and dwelling-houses of the middle ages. The hall is of very

ancient origin. The earliest Saxon buildings on record are the palaces of the kings, and these seem to have consisted of one large hall, in which the king, his courtiers or 'hearth-men,' and all his retainers dwelt together, eating at the same table, and sitting round the same fire; and one other chamber, in which the king and his hearth-men slept, while his retainers slept in the hall. The Normans built their houses on the same plan—with the hall and one Solar or sleeping apartment. The same arrangement prevailed, with slight modifications, during the 12th and 13th c. In the 14th and 15th c., when the country was more settled and prosperous, and manners more refined, more numerous apartments became necessary. The hall, however, still retained its place as the chief apartment. In it the king or the lord of the manor gave audience, administered justice, received and entertained his retainers and guests, and performed all the public acts of fendal life.

At one end of the hall was a raised platform or dais, on which the table of the lord of the manor was placed, and where his more honored guests sat with him. The retainers sat at a table along the lower part of the hall. This part was not always in the cleanest and sweetest condition, and hence it received the name of 'the marsh.'

The hall partook of the style of architecture prevailing at the time when it was built, and being a large and important apartment, was generally ornamental in character. The roofs especially were very carefully and elegantly constructed, as many still remaining show. The hall of the king's palace, now called 'Westminster Hall,' built by William Rufus, and restored by Richard II., is the finest example in England, being 300 ft. long and 100 ft. broad. The great hall at Eltham is another fine example. In the United States Nassau Hall, Princeton; Carnegie Hall, New York; Faneuil Hall, Boston; Independence Hall, Philadelphia, are examples of the modern hall.

HALL OF FAME OF GREAT AMERICANS: a memorial building connecting two of the halls of New York Univ., Univ. Heights, New York City. Completed in 1900 through the beneficence of Helen Gould (q.v.), who donated $100,000 for the purpose, the structure consists of a semi-circular granite edifice comprising a colonnade over 400 ft. long, surmounting a museum of seven rooms occupying the ground floor. In the colonnade are 150 panels destined to receive bronze tablets bearing the names and prominent characteristics of native celebrities dead for 10 years or over. Fifty names were to be selected in 1900, and five each succeeding five years during the century. Public nominations received and approved by the Senate of the University are submitted to a committee of 100 judges, representing every state in the Union, and every eligible name must receive at least 51 votes from this committee. In 1900, only 29 names

received the requisite number of votes: George Washington, 97; Abraham Lincoln, 96; Daniel Webster, 96; Benjamin Franklin, 94; Ulysses S. Grant, 92; John Marshall, 91; Thomas Jefferson, 90; Ralph Waldo Emerson, 87; Henry Wadsworth Longfellow, 85; Robert Fulton, 85; Washington Irving, 83; Jonathan Edwards, 81; Samuel F. B. Morse, 80; David Glascoe Farragut, 79; Henry Clay, 74; Nathaniel Hawthorne, 73; George Peabody, 72; Robert E. Lee, 69; Peter Cooper, 69; Eli Whitney, 67; John James Audubon, 67; Horace Mann, 67; Henry Ward Beecher, 66; James Kent, 65; Joseph Story, 64; John Adams, 61; William Ellery Channing, 58; Gilbert Stuart, 52; Asa Gray, 51. In 1905, the five names elected were John Quincy Adams, James Madison, James Russell Lowell, John Greenleaf Whittier, and Gen. William T. Sherman.

At the time of the first vote it was apparent that there were foreign-born Americans whose names belonged on the tablets. For these provision was made in a hall with thirty panels, and another hall was also provided for famous American women, both native and foreign born. In the new classes in 1905, the names of Hamilton, Agassiz and Paul Jones, Mary Lyon, Emily Chubbuck Johnson and Maria Mitchell were chosen. Among men voted for but who have failed as yet to be chosen, are Edgar Allan Poe, Bryant, Holmes, Fenimore Cooper, Horace Greeley, Noah Webster, Calhoun, Sumner, Gen. Jackson, Seward, Garfield, Blaine, Phillips Brooks, Parkman, Bancroft, Prescott, Gen. Sheridan, Mark Hopkins, and Rufus Choate.

HALL, Alexander Wilford: American editor and author: b. Bath, N. Y., 1819, Aug. 18; d. 1902. He became known as an evangelist, especially through attacks on Universalist doctrine and the theory of evolution as presented by Darwin, Huxley, and Haeckel. In 1881 he established *The Mierocosm*, and in 1893 became president of the Society for Philosophical Research. In 1891 he was elected fellow of the Philosophical Society of Great Britain. His works include: *Universalism Against Itself; The Problem of Human Life; The Immortality of the Soul;* and *The Hygienic Secret of Health.*

HALL, Anna Maria: novelist: 1802–1881, Jan. 30; b. Dublin; daughter of a gentleman named Fielding, who died when she was very young. In her 15th year she left Ireland with her mother, and went to reside in London, where her education was completed. In 1824 she married Samuel C. Hall (1800–1889, March 18; well-known for his works connected with the fine arts), and was thus led to become an authoress. Her first work, *Sketches of Irish Character* (1828), established her reputation. In 1832 she brought out her first novel, *The Buccaneer*, a story of the time of the Commonwealth, in which Cromwell's character is vindicated. Other works rapidly followed—*Tales of Woman's Trials*

(1834); *The Outlaw*, a novel of the reign of James II. (1835); *The French Refugee*, a drama, which in 1836 was acted for about 50 nights at St. James's Theatre, London; *Uncle Horace*, 3 vols. (1837); *Lights and Shadows of Irish Character* (1838); *Marian, or a Young Maid's Trials* (1839); *The Whiteboy* (1845), etc. She was also the authoress of a graceful fairy tale of love, *Midsummer Eve*, and of a pleasant illustrated series of descriptive sketches, *Pilgrimages to English Shrines*.

HALL, Arthur Crawshay Alliston, American Protestant Episcopal bishop: b. Benfield, Berkshire, England, 1847, Apr. 12. He was graduated from Christ Church, Oxford, in 1869, took orders, entered the Society of St. John the Evangelist (Cowley Fathers), in 1874 became assistant minister of the Church of the Advent, Boston, and from 1882 to 1891 was there minister of the mission church of St. John the Evangelist. In 1894 he was consecrated bishop of Vermont, after release from the Cowley order. His publications include: *Confession and the Lambeth Conference* (1879); *Meditations on the Creed* (1880); *Meditations on the Collects* (1887); and other doctrinal and devotional works.

HALL, Asaph, American astronomer: b. Goshen, Litchfield co., Conn., 1829, Oct. 15; d. Annapolis, Md., 1907, Nov. 22. After private study he attended Central College, McGrawville, N. Y., in 1854–5, was for a term a pupil of Francis Brünnow at the University of Michigan, taught at Shalersville, Ohio, and later was appointed assistant to Bond in the Harvard observatory. He became assistant in the Naval Observatory at Washington in 1862, and in 1863 professor of mathematics in the navy, with relative rank of captain. He continued in the government service until 1891, when he was retired on account of age, with relative rank of captain. While at the Naval Observatory, he was despatched on several expeditions, including those for observation of solar eclipses to Bering Strait in 1869, to Sicily in 1870, and to Colorado in 1878. He was also in charge of the American party sent to observe the transit of Venus at Vladivostock, Siberia, in 1874, and chief astronomer of the expedition to San Antonio, Tex., for the transit of 1882. Among his many discoveries the most important is that of the moons of Mars (1877, Aug.), which he named Deimos and Phobos, and whose orbits he calculated. Among his later work is a valuable study of double stars. In 1895–1901 he was professor of astronomy at Harvard. He received the Lalande prize of the French Academy of Sciences in 1878, its Arago medal in 1895, and the gold medal of the Royal Astronomical Society in 1879. In 1902 he was president of the American Association for the Advancement of Science.

HALL, Basil, Captain, R.N., distinguished traveller: 1788 Dec. 31—1844, Sep. 11: b. Edinburgh; younger son

of Sir James Hall of Dunglass. He entered the navy 1802, and became post-capt. 1817. When Lord Amherst was sent on a mission to the court of Pekin 1816, Hall commanded the *Lyra*, which accompanied the expedition, and visited parts of the Corean coast, little known to Europeans. His book, *A Voyage of Discovery to the Western Coast of Corea*, etc. (Lond. 1818), excited much interest. Among Hall's works, are *Extracts from a Journal written on the Coast of Chili, Peru, and Mexico, in* 1820–22 (two of the earlier vols. of *Constable's Miscellany*); *Travels in N. America*, 3 vols. (violently assailed by the American press); *Fragments of Voyages and Travels* (three series, nine vols.), still very popular; and *Patchwork* (3 vols. 1841).

HALL, Charles Cuthbert: an American clergyman; b. New York, 1852, Sep. 3; d. there 1908, Mar. 25. He graduated at Williams College, 1872; afterward studied theology at Union Theological Seminary and abroad; was ordained in the Presbyterian Church; held pastorates in Newburg, N. Y., 1875–77, and in Brooklyn, N. Y., 1887–97; and became president of the Union Theological Seminary in the latter year. He published *Into His Marvellous Light: Studies in Life and Belief* (1891); *Does God Send Trouble?* (1894); *The Children, the Church and the Communion* (1895); *The Gospel of the Divine Sacrifice* (1896); *Christian Belief Interpreted by Christian Experience* (1905); *Redeemed Life after Death* (1905); etc.

HALL, Charles Francis: 1821–1871, Oct. 10; b. Rochester, N. H.: Arctic explorer. He received a common-school education, learned the blacksmith's trade, removed to Cincinnati and engaged in journalism and the stationery and engraving business, and becoming interested in the fate of Sir John Franklin spent 1850–60 studying the history of the Arctic regions and the experiences of the English search parties. In the winter of 1859–60 he proposed to the New York Geographical Soc. to head an expedition to search for the remains of Franklin and his companions and the records that he felt sure they had left. Through the active interest of Henry Grinnell (q.v.), the necessary funds were provided, and 1860, May 29, Hall sailed from New London, Conn., on a whaling vessel, commanded by Capt. Sidney O. Buddington (d. 1888). The vessel becoming blocked in by the ice, Hall left it, spent two years among the Esquimaux, and discovered relics of the Frobisher expedition of 1577–8. Returning to the United States 1862 he published *Arctic Researches and Life among the Esquimaux*, planned a second expedition and sailed again 1864, July 1. He returned in the summer of 1869 with undisputed relics of the Franklin party, and satisfied that none of Franklin's men could be living, but eager for an opportunity to extend geographical knowledge by penetrating the supposed open polar sea, 'An Expedi-

tion to the North Pole' was authorized by congress and fitted out by the navy dept., and 1871, July 3, Hall started on his third arctic voyage from New London in the *Polaris*, in which he went as commander, Capt. Buddington as sailing-master, and Dr. Emil Bessels (d. 1888) as chief of scientific work, besides 24 others. On Aug. 29, the *Polaris* reached the highest point then attained by any vessel, 82° 16′ n., and being laid up for the winter, Hall started on a sledge journey, reached lat. 82° n., and returning to Thank God Harbor, Greenland, died suddenly of apoplexy. After much suffering the crew abandoned the vessel, and divided into two parties—one drifting on floating ice 195 days and being rescued 1873, Apr. 30, the other tossed in rudely constructed boats till picked up at sea 1873, June 23.

HALL, Charles Winslow, American lawyer and author: b. Chelsea, Mass., 1843, Nov. 2. He was admitted to the Suffolk bar in 1866 and besides editing various New England journals has written: *Arctic Rovings* (1861); *Twice Taken* (1867); *Adrift in the Icefields* (1877); *Drifting Round the World* (1881); *Legends of the Gulf; Cartegena, or the Last Brigade; Regiments and Armories of Massachusetts;* etc.

HALL, Chester Moor, English inventor: b. Leigh, Essex, England, 1703, Dec. 9; d. Sutton, Essex, 1771, Mar. 17. He was a large land-owner in Essex, and convinced from study of the human eye that achromatic lenses were possible, he discovered two varieties of suitable glass in 1729, and in 1733 made several telescopes later declared by experts to be achromatic. Indifferent to his claims of priority, he did not appear at the trial of Dollond *v.* Champnèss. Later his invention of the achromatic telescope in the year 1733 was adjudged by Lord Mansfield conclusively proven.

HALL, Christopher Webber: an American educator; b. in Wardsboro, Vt., 1845, Feb. 28: was graduated at Middlebury College, 1871; afterward studied in Europe; and became professor of geology and mineralogy in the University of Minnesota in 1878. He became president of the Minnesota Academy of Natural Science, 1888; was dean of the College of Engineering, Metallurgy, and Mechanic Arts, 1892–97: and was author of *Syllabus of Physical Geography; Syllabus of General Geology; Geography of Minnesota* (1903): etc.

HALL, Edwin Herbert: an American educator; b. in Gorham, Me., 1855, Nov. 7: was graduated at Bowdoin College, 1875: studied physics at Johns Hopkins University 1877–81: was instructor of physics at Harvard University in 1881: assistant professor 1888–95; and became professor in the latter year. He was author of *A Text-book of Physics; Lessons in Physics;* (with Smith) *The Teaching of Chemistry and Physics* (1902); *College Laboratory Manual of Physics* (1904); and of

numerous articles in scientific and educational periodicals.

HALL, Fitzedward, American philologist: b. Troy, N. Y., 1825, March 21; d. Marlesford, England, 1901, Feb. 1. He was graduated from Harvard in 1846; spent many years in India; made a thorough study of its tongues, and contributed to its local journals original translations and original articles. In 1850 he became tutor, in 1853 professor, in the government college at Benares; in 1855 was transferred to Ajmere as inspector of schools for Ajmere and Maiwara; and in 1856 to a like post in the Central provinces. In 1862–79 he was professor of Sanskrit, Hindustani, and Indian jurisprudence in King's College, London; in 1864 became examiner in Hindustani and Hindu to the civil-service commission; in 1880 examiner in Sanskrit to succeed Max Müller; and in 1887 also examiner in English. He was the first American to edit a Sanskrit text—*The Atmabodha, with its Commentary, and the Tattvabodha* (1852). He also prepared an edition of the *Vishnupurâna*, containing numerous quotations from manuscripts owned by him; and editions of many other Sanskrit books. His collection of 1,000 Oriental manuscripts and 1,000 works on special subjects, he gave to Harvard. He wrote further: *Modern English* (1873), *Doctor Indoctus* (1880), and other works on English philology, and contributed to the *New Oxford Dictionary*.

HALL, Florence Marion Howe, American author and lecturer: b. Boston 1845, Aug. 25. She is a daughter of Julia Ward Howe (q.v.). Prominent in the women's club movement, she became vice-president of the General Federation of Women's Clubs, and chairman of the educational department of the New Jersey State federation of women's clubs. In 1893–1900 she was president of the New Jersey Women's Suffrage Association. Her writings are: *Social Customs* (1887); *The Correct Thing* (1888).

HALL, Francis J., American Episcopal theologian: b. 1856, Jan. 24. He was graduated from Racine College, Wis., and the General Theological Seminary, New York, and has been professor of dogmatic theology in the Western Theological Seminary from 1886. He has published *Theological Outlines* (1892–5); *Historical Position of the Episcopal Church* (1896); *The Kenotic Theory* (1898).

HALL, George Henry, American artist: b. Boston 1825. He studied art at Düsseldorf, Paris, and Rome; established his studio in New York; and became known as a still-life and figure painter. In 1868 he was elected a national academician. Among his works are *April Showers; Studies of Grapes; The Seasons;* and *Bric-a-Brac of Damascus.*

HALL, Gertrude, American writer: b. Boston, 1863,

Sept. 8. She has written *Far from To-day*, a collection of short stories; *Allegretto*, a book of verse; *Foam on the Sea, and Other Tales; The Hundred and Other Stories* (1898); *The Age of Fairy Gold*, verse (1899); *April's Sowing* (1900). Her work, both in verse and prose, is distinctively original.

HALL, Granville Stanley, ph.d.: educator: b. Ashfield, Mass., 1845, May 6. He graduated at Williams College 1867, studied theol. at Union Theol. Seminary, was prof. of English Literature and Philosophy at Antioch College, Ohio, studied philosophy and the science of education two years in Berlin, two in Leipsic, one in Bonn, and one in Heidelberg, was lecturer at Harvard Univ. and Williams College 1876, 1881–2, was appointed prof. of psychology and pedagogics in Johns Hopkins Univ. 1882, and accepted the presidency of the new Clark Univ. at Worcester, Mass., 1888, May 1. He has published *Aspects of German Culture* (1881), in conjunction with John M. Mansfield *Hints toward a Select and Descriptive Bibliography of Education* (1886). Was editor of the *American Journal of Psychology*.

HALL, Isaac Hollister, American Oriental scholar: b. Norwalk, Conn., 1837, Dec. 12; d. Mount Vernon, N. Y., 1896, July 2. Graduated from Hamilton College in 1859, he was there tutor until 1863, in 1865 was graduated from the Columbia Law School, and until 1875 was a practitioner in New York. In 1875–7 he was professor in the Syrian Protestant College at Beirut, and later at Cyprus aided Gen. di Cesnola, then United States consul, in the arrangement of the Cypriote collection now in the Metropolitan Museum of New York. From 1884 until his death he was curator of sculpture and archæology in the Metropolitan Museum. He also lectured on New Testament Greek at the Johns Hopkins University; published (1884) an account, with facsimile pages, of the Syrian manuscripts of the Gospels, Acts, and the larger part of the Epistles, discovered by him (1876) at Beirut; and compiled a *Critical Bibliography of the Greek New Testament* (1884).

HALL, Sir James, English geologist and chemist: b. 1761; d. Edinburgh 1832, June 23. Early interested in geological questions, he made the acquaintance of James Hutton and Playfair, and himself states that he came to adopt Hutton's system after three years of almost daily discussion with its founder. In the examination of this system, whose leading principle explains the conformation of the earth's crust by the action of constant natural changes, he traveled in Scotland, the Alps, Italy, and Sicily. Hall was the first geologist directly to apply chemical laboratory tests to the hypotheses of geology, but published no results of his work in this field until after the death (1797) of Hutton who objected to the judgment of the vast operations of nature through 'having kindled a fire and looked into the bottom

of a little crucible.' He was elected president of the Royal Society of Edinburgh, invented a machine for the regulation of high temperatures, and in 1807–12 represented Michael (or Mitchell), Cornwall, in Parliament. He wrote various scientific memoirs.

HALL, JAMES, American lawyer and author: b. Philadelphia 1793, Aug. 19; d. near Cincinnati, Ohio, 1868, July 5. He served in the army 1812–18, and subsequently studying law became judge of the circuit court of Illinois, and also State treasurer. In 1833 he took up his residence in Cincinnati, and devoted himself to banking and literature. His chief works are: *Legends of the West; Harpe's Head, a Legend of Kentueky* (1833); *Sketches of the West* (1835); *Tales of the Border* (1835); *Notes on the Western States* (1838); *History of the Indian Tribes* (1838–44) with McKenney; *The Wilderness and the War-Path* (1845); *Romance of Western History* (1859).

HALL, JAMES, LL.D.: paleontologist: 1811, Sept. 12—1898, Aug. 7. He graduated at the Troy (N. Y.) Polytechnic Institute 1832; was asst. prof. of chemistry and natural sciences there till 1836; became one of the state geologists of N. Y. 1837, and state paleontologist 1843; held the latter office till 1875: was appointed state geologist of Ia. 1855, and Wis. 1857; director of the N. Y. State Museum 1866; was a founder of the International Congress of Geologists, 1876, and a vice-pres. at the sessions in Paris 1878, Bologna 1881, and Berlin 1885; and was elected corresponding member of the French Acad. of Sciences 1884. He was a founder of the American Assoc. of Geologists and Naturalists 1840 (parent of the Amer. Assoc. for the Adv. of Sci.), and pres. 1856; was elected one of the 50 foreign members of the Geological Soc., of London 1848, and received the Wollaston medal of the latter Soc. 1858, and the grand prize of $1,000 of the Boston Soc. of Natural Hist. 1884. Among his publications may be named *Geology of New York* (1843); *Palæontology of New York* (1847 *et seq.*); *Graptolites of the Quebec Group* (1865); as well as parts of the Geological Reports of Iowa (1858–9); and Wisconsin (1862).

HALL, JOHN, D.D., LL.D.: Presb. clergyman: b. co. Armagh, Ireland, 1829, July 31; d. Bangor, co. Down, Ireland, 1898, Sept. 17. He entered Belfast College when 13 years old, won the Hebrew prize several times, was licensed to preach 1849, became pastor of the First Presb. Church in Armagh 1852, and St. Mary's Abbey in Dublin 1858; received royal appointment as commissioner of education for Ireland; was delegate of the Presb. Church in Ireland to the Presb. churches in the United States 1867, was called to the pastorate of the Fifth Avenue Presb. Church, New York, and installed 1867, Nov. 3. His success in this field was so

large that the congregation erected a $1,000,000 church edifice 1875. He delivered the funeral sermon of Chief-Justice Chase 1873. He was elected chancellor of the Univ. of the City of New York 1882 and served in that position until 1890; he was also trustee of Princeton University, Union Theological Seminary, and of Wellesley College. He published *Family Prayers for Four Weeks* (1868); *Papers for Home Reading* (1871); *Questions of the Day* (1873); *God's Word through Preaching* (1875); *Foundation-Stones for Young Builders* (1879); *A Christian Home: How to Make and How to Maintain It* (1883).

HALL, Joseph, Bishop of Norwich, England: remarkable for learning, piety, and misfortunes: 1574, July 1—1656, Sep. 8; b. Ashby de-la-Zouch, Leicestershire. He was educated at Emanuel College, Cambridge, of which he became a fellow. He became, 1617, Dean of Worcester, was one of the English deputies to the synod of Dort, was consecrated Bishop of Exeter 1627, and 1641 was translated to Norwich. The latter years of his life were saddened by persecution. He was accused first of Puritanism, though he zealously defended the Episcopacy. By attacking the Arminianism of Abp. Laud, he is said to have 'exposed himself to the malignant and wanton attacks of that primate and his crew.' In 1640, he wrote *Episcopacy by Divine Right Asserted*. In 1641, having joined the prelates who protested against the validity of all laws passed during their forced absence from parliament, he was committed to the Tower, and threatened with a prosecution for high treason, but was set at liberty, at the end of seven months, on finding bail for £5,000. After his return to Norwich, his revenues and property were sequestered by parliament, an allowance of £400 a year being made for his support. He rented a small farm at Higham, near Norwich, to which he retired 1647. His works, mostly controversial, have been published in folio, quarto, and octavo. They show wisdom and wit. A new ed., with autobiography, notes, etc., was published by the Rev. Josiah Pratt (Lond. 10 vols. 1808); a later ed. by the Rev. Peter Hall, descendant of Joseph (Oxford 12 vols. 1837–39). His writings most interesting at the present time are poetical *Satires*, written at college, which Pope, no mean judge of that species of composition, affirms to be 'the best poetry and the truest satire in the English language.' Hallam, however (*Lit. Hist. of Europe*), accuses him of being 'harsh and rugged,' and asserts that 'his lines frequently bear no visible connection in sense or grammar with their neighbors.' Among his works are *Contemplations*, *Art of Divine Meditation*, and *Enochismus, or Treatise on the Mode of Walking with God*.

HALL, Lyman, M.D. 1725–90, Oct. 19: b. Conn.: signer of the Declaration of Independence. He graduated at

Yale College 1747; removed to Sunbury, Ga., and began practicing medicine 1752; was a member of the Savannah convention 1774–5; delegate to and member of congress 1775–80; and gov. of Ga. 1783. His property was confiscated by the British during the occupation of Ga., and after his term as gov. he retired to private life.

HALL, MARSHALL, M.D.: physiologist and physician: 1790, Feb. 18—1857, Aug. 11; b. Basford, Nottinghamshire. At the age of 20 (having been previously apprenticed to a chemist) he began the study of medicine at the University of Edinburgh, where, 1812, he took his degree M.D. After three years at the leading schools of medicine on the continent, he began practice in Nottingham 1815, and rapidly obtained high provincial reputation. In 1826, he removed to London, where his career as a physician was so successful that he was enabled at the age of 60 to release himself from strictly professional labor. Among his contributions to physiology are *Essay on the Circulation of the Blood* (1831), in which he made known his discovery of the remarkable 'caudal heart' connected with the vessels in the tail of the eel; paper 'On the Inverse Ratio which subsists between the Respiration and Irritability in the Animal Kingdom,' in the *Philosophical Transactions* 1832; and articles 'Hybernation' and 'Irritability' in Todd's *Cyclopædia of Anatomy and Physiology*. But his name is best known in connection with the doctrine of the Reflex Function of the Nervous System, which was his most engrossing subject of pursuit for the last 25 years of his life. In the *Philosophical Transactions* 1833 appeared his *Memoir on the Reflex Function of the Medulla Oblongata and Medulla Spinalis*. His views were extended and corrected in various publications, especially his *Lectures on the Nervous System and its Diseases* (1836) *Memoirs on the Nervous System* (1837), *New Memoir on the Nervous System* (1843), and *Synopsis of the Diastaltic Nervous System* (1850). There has been much discussion as to Hall's claims to be considered the discoverer of Reflex Action. He admitted that the phenomena of which he treated had been long known to physiologists, but he believed himself to have been the first to show their independence of sensation, to bring them together under one generalization, to establish with precision the laws of their production, to assign them their just rank in physiology, and to apply the doctrine to the elucidation of disease. His more strictly professional writings are many and valuable. His last gift to the science of medicine and to humanity, was the description of a simple and easy method of restoring suspended respiration, which has been the means of saving many from untimely death; it is known as the Marshall Hall method.

HALL, ROBERT: English Baptist minister, one of the greatest of English pulpit orators: 1764, May 2—1831,

Feb. 21; b. Arnsby, near Leicester, England; son of a Bapt. minister of some note as a preacher and author of religious works, and was the youngest of 14 children. At the age of 15 he was sent to a Bapt. academy at Bristol, when he gave promise of his future fame as an orator. In 1781, he entered King's College, Aberdeen, where he remained four years. Graduating 1785, he became at the age of 21, assistant Bapt. minister and tutor in the acad. at Bristol. In consequence of a disagreement with his colleague, he went 1790 to Cambridge, where, by his elaborate composition and vivid eloquence, he rose to the highest rank of British orators. He was also widely known as a master of prose style, his most noted writings being *Apology for the Freedom of the Press* (1793); *Modern Infidelity* (1800); *Reflections on War* (1802). He was subject to attacks of insanity, but in spite of this misfortune accomplished a vast amount of intellectual work and was a tireless student. His complete works in six volumes reached an 11th edition in 1853.

HALL, Robert Henry: an American military officer; b. Detroit, Mich., 1837, Nov. 15; was graduated at the U. S. Military Academy in 1860; promoted 1st lieutenant, 1861; captain, 1863; major, 1883; lieutenant-colonel, 1888; colonel, 1893; and brigadier-general, 1901; and in the volunteer service was commissioned a brigadier-general, 1898. He was retired 1901, Nov. 15. He served throughout the civil war and the war with Spain with distinction. In 1899 he went to the Philippines; conducted an expedition from Siniloan to Binangonan; occupied the latter place, 1900, Oct. 9; captured insurgents' gun-boat; and took possession of the island of Polillo Oct. 12 following. He has published *Register of the United States Army* 1789–98; *History of the Flag of the United States; History of United States Infantry Tactics; History of Fort Dearborn; Review of Works of United States History;* etc.

HALL, Ruth, American novelist: b. Schoharie, N. Y., 1858, April 10. Besides more or less journalistic work she has written: *In the Brave Days of Old* (1898); *The Boys of Scrooby* (1899); *The Black Gown,* a novel of colonial Albany (1900); *The Downrenter's Son,* a novel of the anti-rent troubles in New York State (1902); *The Golden Arrow* (1903); etc.

HALL, Thomas: an American inventor; b. in Philadelphia, Pa., 1834, Feb. 4; was educated at the University of Pennsylvania, and subsequently took a course in mechanics in Europe. His inventions include a mechanism for printing by touching keys; a keyed typewriter, which he exhibited at the Paris Exposition, 1867; the Hall typewriter; sewing machines, etc.

HALL, Thomas Cuming: an American clergyman; b. in Armagh, Ireland, 1858, Sept. 25; was graduated at

Princeton University, 1879; and Union Theological Seminary, 1882; subsequently studied in Berlin and Göttingen; held pastorates in Presbyterian churches in Omaha, 1883–86, and in Chicago, 1886–87; and became professor of theology at Union Theological Seminary in 1898. He was author of *The Power of an Endless Life* (1893); *The Social Significance of the Evangelical Revival in England* (1899); *The Synoptic Gospels* (1900); *John Hall, Pastor and Preacher* (1901); etc.

HALLAM, *hăl'am*, HENRY: philosophic historian and critic: 1777 (or 8)—1859, Jan. 21; b. Windsor, England; son of the Dean of Bristol. He was educated at Eton and Christ-church, Oxford, where he took his degree M.A. He was known first by his writings in periodicals, especially the *Edinburgh Review* in its early years; afterward, he was distinguished among the literary men of Europe for extensive and profound learning, powers of generalization, taste, judgment, and conscientiousness exhibited in a succession of great works: *View of the State of Europe during the Middle Ages* (2 vols. 4to, 1818); *The Constitutional History of England from the Accession of Henry VII. to the Death of George II.* (2 vols. 4to, 1827); and *Introduction to the Literature of Europe in the 15th, 16th, and 17th Centuries* (4 vols. 4to, 1837–39), and a volume of supplementary notes to his *History of the Middle Ages* (1848). All these works have gone through several editions, and been translated into the languages of the leading European nations. They have procured for their author the enviable reputation of having opened a new and great field of authorship, and labored in it with a success not as yet equalled. Their wonderful impartiality and veracity are a rebuke to ordinary historians; and it provokes a smile to read, at this distance of time, the strictures of Southey on the acrimony, the arrogance, the injustice, and the ill-temper of their author; for England never produced a man who loved truth more disinterestedly than Hallam. It has however been justly said by a discriminating writer that Hallam's 'criticism is apt to assume a tone of moral censure when he has to deal with certain extremes of human thought.' Hallam, while yet a young man, was held in the highest estimation among the literary men of his time, in London and Edinburgh. During the greater portion of his long life, however, he lived in London in privacy, engaged in linguistic and historical studies. In politics, he was a whig; but for the conflicts of parties he was unsuited by his candor and general temperament, and took no part in them; but he displayed a genuine interest in all questions of social improvement, and acted with the Wilberforce party for the abolition of slavery, as well as in other humane schemes, and was one of the original promoters of the Soc. for the Diffusion of Useful Knowledge.

Hallam was a fellow of the Royal Soc., and of many

other societies, and was a trustee of the British Museum. Hallam had two sons, both of great promise, and both prematurely cut off; the elder, ARTHUR HENRY HALLAM (1811–33; d. on a tour, in Vienna), was the friend of Alfred Tennyson the laureate, to whose sister he was engaged to be married; and is the subject of *In Memoriam*. Of this son Hallam wrote a touching memoir.

HALLE, CHARLES, LL.D.: pianist; b. Hagen, Westphalia, 1819; d. 1895, Oct. 25. He studied first at Darmstadt; afterward at Paris, where his reputation was established by his concerts of classical music. After the revolution of 1848, he went to England, ultimately settling in Manchester. He and his highly trained orchestra were familiar to the music-lovers of Great Britain from London to Aberdeen. He did much to raise the popular standard of musical taste. He was made LL.D. of Edinburgh Univ. 1884.

HALLE, or HALLE AN DER SAALE, *hâl'lĕh ân dĕr sâ'lĕh:* city of Prussian Saxony, dist. of Merseburg; on the right bank of the Saale, and on several small islands of the river, 20 m. w.n.w. of Leipzig. Halle an der Saale is to be distinguished from several other places named Halle. It consists of the mediæval town with narrow, crooked streets and ancient dwellings, separated by boulevards on the site of the old ramparts, from extensive and handsome suburbs. Among notable public buildings are the restored mediæval Rathaus; the 'Red Tower' in the market place, a 15th century clock-tower; the decaying Moritzburg, formerly a citadel and archiepiscopal residence; the modern Gothic Ratskeller; the extensive buildings of the University (q.v.); a deaf and dumb asylum; a lunatic asylum; the 12th century Moritzkirche with fine wood carvings; the 16th century Protestant cathedral; and the 16th century Gothic church of the Virgin, with four towers and noted for its handsome interior. In the suburb of Glaucha the Waisenhaus, 'orphan house,' or institution founded by the Rev. Francke about 1693 forms a small town in itself. Besides the orphan asylum it includes different grade schools, attended by between 3,000 and 4,000 pupils; a printing and publishing establishment; and a laboratory where medicines are prepared and sold. The trade and manufactures of Halle are extensive. The latter include starch, beet-root sugar, chemicals, oil, machinery, etc., besides the celebrated ancient salt works. The salt workers form a distinctive colony with special exemptions and privileges and are known as 'Halloren.'

Halle, originally a border fortress against the Slavs, became in the 10th c. an appanage of the Archbishops of Madgeburg, and by the 12th c. was famous as a commercial city. In the 12th and 13th c., Halle was a powerful member of the Hanseatic league, and waged war with neighboring potentates. Terribly impoverished during the Thirty Years' War, Halle was incorporated

with the dominion of the Elector of Brandenburg at the peace of Westphalia. Pop. (1901) 156,611.

HALLE, UNIVERSITY OF, Germany, a celebrated institution founded in 1694 by King Frederick I. in the interests of the jurist Thomasius, when he was followed to Halle by several students after his retirement from Leipsic owing to the envy of his fellow professors. It attained a high degree of prosperity, but owing to its strong Prussian proclivities was suppressed by Napoleon in 1806 and in 1813. It was re-established in 1815 and in 1817 was united with the University of Wittenberg. Its buildings which are very extensive, especially those accommodating the medical faculty, date from 1832. There are faculties of theology, law, medicine, and philosophy. From its foundation Halle was recognized as one of the principal schools of Protestant theology, and has numbered among its professors some of the most eminent names of Germany. Connected with the university is an ever-increasing library of over 220,000 volumes and MSS., a medical and surgical clinical institute; a maternity hospital; an observatory; a theological and normal seminary; and a botanical garden; especial attention is devoted to agriculture. The university has nearly 2,000 students.

HALLEAN HERETICS, n. *hăl'lē-an hĕr'ĕ-tĭks* [from *Halle* in Swabia]: in *chh. hist.*, name given to the Cathari, the Waldenses, or the Petrobrusians, in the 13th century.

HALLECK, *hăl'ĕk*, FITZ-GREENE: 1790, July 8—1867, Nov. 19; b. Guilford, Conn.: poet. By his mother, Mary Eliot, he was descended from John Eliot, 'the apostle of the Indians.' He became a clerk in a bank in New York, 1811, and was afterward in business. He was confidential agent of John Jacob Astor, 1824–49. In 1849, he retired, and took up his residence in his native place, where he spent the remainder of his days. From his boyhood, Halleck wrote verses; but in 1819, he wrote his longest poem, *Fanny*, a satire on the literature, fashions, and politics of the time, in the measure of *Don Juan*. He also wrote, under the signature 'Croaker Junior,' in the humorous series of 'Croaker papers' for the New York *Evening Post*. Halleck visited Europe 1822–3, and published an edition of his poems 1827. Halleck's style is spirited, flowing and graceful, smooth and harmonious. His poems show geniality and tender feeling, with delicate and refined humor. They are included in a 12mo volume of moderate size.

HAL'LECK, HENRY WAGER: 1816, Jan. 15—1872, Jan. 9; b. Waterville, Oneida co., N. Y.: soldier. He entered West Point Military Acad. 1835, graduated 1839; and for about a year acted as assist. prof. of engineering; in 1841–44 was employed in connection with the repairing and strengthening of the fortifications in New York

harbor; 1845, was sent on a govt. mission to examine European military establishments, and, returning, delivered in the Lowell Institute, Boston, a course of lectures on military art and science. During the Mexican war, he served on the lower coast of California, and, for his gallant services, was breveted capt. 1847. Was sec. of state for California, 1847–49, under the military govt. of Kearney, Mason, and Riley; and in 1849, was a member of the convention to form and draft the state constitution. He became capt. of engineers 1853, left the service 1854, and practiced law in San Francisco. On the outbreak of the civil war, he joined the Northern army 1861 as maj.gen., and in Nov. was appointed commander of the Dept. of the West. In 1862, July, he became general-in-chief, holding this position till 1864, Mar., when he was succeeded by Gen. Grant, and was appointed chief of staff. He commanded the division of the James, 1865, in which year he was transferred to the military division of the Pacific; thence he was transferred to that of the South, which he held till his death, at Louisville, Ky. Besides his Lowell lectures, he published various works on the law of mining, and on international law.

HALLEL [Heb. *praise*]: in the largest sense, The Book of Psalms, the name for which, in the Jewish Scriptures, is simply, Praises. In a restricted sense, the name is applied to several portions of the book—e.g., to that which comprises Ps. xiii–xviii., which, according to Hengstenberg, was usually called the 'great hallel,' and was sung especially at the Feast of Tabernacles and the Passover. The hymn which the Saviour and the apostles sang at the close of his last observance of the Passover with them, was probably a part of these psalms. But the grandest occasion on which this great hallel was used was at the entrance of Christ into Jerusalem, when the multitudes that went before and that followed cried, 'Hosanna to the son of David: *Blessed is he that cometh in the name of the Lord.*' And when, on the next day, Jesus said to the chief priests and elders, Did ye never read, '*The stone which the builders rejected, the same was made the head of the corner?*' it was no half-forgotten sentence of which he reminded them, but a conspicuous part of their own great hallel, which they and the whole nation were preparing to sing in the Temple service and at home.

HALLELUIAH, int. *hăl'lĭ-lō'yă*, also spelled HAL'LELUJAH and AL'LELU'IAH or AL'LELU'IA [Heb. *halelú Jáh*, praise ye Jehovah—from *halal*, to praise; *Yah* or *Jah*, Jehovah]: *Praise ye the Lord:* N. a song of praise or thanksgiving; one of the forms of doxology used in the ancient church, derived from the Old Testament, and retained, even in the Greek and Latin liturgies, in the original Hebrew. The singing of the doxology in this form dates from the very earliest times; but considerable diversity has prevailed in different churches and at different periods as to the time of using it. In general, it may be said that, being in its nature a canticle of gladness and triumph, it was not used in the penitential seasons, nor in services set apart for occasions of sorrow or humiliation. In the time of St. Augus-

tine, the African Church used the H. only from the feast of Easter to that of Pentecost. In other churches, it was found in most of the services throughout the year, with the exception of the seasons of Lent and Advent and the vigils of the principal festivals. In the Rom. Cath. Church, the H. is introduced both into the mass and into the several hours of the public office, but it is discontinued from Septuagesima Sunday until Easter; and on the contrary, during the interval between Easter and Pentecost, it is introduced more frequently into the services and in circumstances of greater solemnity. It is always omitted in the services for the dead, and on the ember days, at the quarter tense, and on the principal vigils. In the Church of England, the first Prayer-book of Edward VI. retained the H. in the original Hebrew. In the present Prayer-book, though retained, it is not in the Hebrew, but in its English equivalent, *Praise ye the Lord.* See Binterim's *Denkwürdigkeiten der Christ-Kathol. Kirche.*

HALLELUJAH LASS, n. *hăl-lĭ-lō'ya lăs:* name given to those women, officers, or members of the 'Salvation Army,' who are prominent in the public exercises.

HALLER, *hâl'ĕr*, Albrecht von: 1708, Oct. 16—1777, Dec. 17; b. Bern: physiologist. In early life, he was feeble, being affected with rickets, a disease frequently accompanied by intellectual precocity. His father, Nicholas Emmanuel von H., an advocate, intended him for the clerical profession; but his own inclinations were toward the medical, and, 1723, two years after his father's death, he went to the Univ. of Tübingen, where he was pupil of the well-known anatomist Duvernoy. In 1725, he removed to Leyden, attended the lectures of Boerhaave and of Albinus, and obtained the degree M.D. 1727. He then visited London, Oxford, and Paris, where he studied anatomy and botany under Winslow and De Jussieu; but one of his neighbors, annoyed by his dissections, having threatened to denounce him to the police, he retreated to Basel, where he became pupil of John Bernoulli, mathematician. After seven years' study in these different seats of learning, he returned in his 22d year to his native city, and began practice as a physician. The prof. of anatomy, Meig, having fallen ill, H. undertook the duties of his class; he also published a celebrated descriptive poem entitled *Die Alpen* (The Alps). In 1735, he was appointed physician to the hospital, and, shortly afterward, principal librarian and curator of the cabinet of medals; but in 1736, George II., wishing to establish a univ. at Göttingen, offered him the professorship of medicine, anatomy, botany, and surgery, which, after hesitation, he accepted. From this time, he gave up professional practice, applying himself for the next 18 years to teaching and original research. He was active in the formation of the Royal Acad. of Siences of Göttingen, whose memoirs, *Commentarii Societatis Regiæ Scientiarum Gottingensis,* contain many of his papers. During his professorship, 1736–53, he composed and published 86 works on medical subjects,

chiefly physiology and botany; and it is recorded that he contributed more than 12,000 notices or reviews of books to the *Göttingische gelehrte Anzeigen*, a monthly periodical, of which he was editor. In 1753, in consequence of disputes with his colleagues, and probably in part from the delicate state of his health, he resigned his chair, and returned to his native town, where he subsequently held important and honorable offices He retained his position as pres. of the Royal Acad. of Sciences. After his retirement from Göttingen, some of his most important writings were published, among which were *Elementa Physiologiæ Corporis Humani* (Lausanne, 8 vols. 4to 1757–66)—by far the most important of his works—and his four *Bibliothecæ*, or critical catalogues of works on botany, surgery, anatomy, and medicine. The increasing maladies of his later days did not distract his mind from his favorite studies. He recorded all the symptoms of his last illness—a combination of gout and disease of the bladder—and the gradual cessation of his vital functions; and his last words, addressed to his physician, were: 'My friend, the pulse has ceased to beat.'

H.'s eminence as a man of science was duly recognized even in his own lifetime. In 1739, he was appointed physician to the king of Great Britain; he was ennobled by the emperor of Germany, 1748; the universities of Berlin, Oxford, and Utrecht in vain endeavored to obtain him as professor; and he was an honorary member of all the scientific societies of Europe. His name is connected especially with the doctrine of muscular irritability (see MUSCLE AND MUSCULAR TISSUE); and though he made few positive additions to our knowledge, his teaching and writings impressed a new aspect on physiology—a science of which he has been termed 'The Father.' Moreover, by his work as poet, H. contributed to the movement which toward the end of the 18th c. brought new life to German poetry.

HALLEY, *hăl'ĭ*. EDMUND: astronomer and mathematician: 1656, Oct. 29—1742, Jan. 14; b. Haggerston, near London; son of a London soap-boiler. He was educated at St. Paul's School, and at Queen's College, Oxford, which he entered 1673. He early became an experimenter in physics—before leaving school, he had made observations on the variation of the needle. In 1676, he published a paper (*Philosophical Transactions*) on the orbits of the principal planets; also observations on a spot on the sun, from which he inferred its rotation round its axis. In Nov. of the same year he went to St. Helena, where for two years he applied himself to the formation of a catalogue of the stars in the s. hemisphere, which he published 1679 (*Catalogus Stellarum Australium*). On his return, he was chosen a fellow of the Royal Soc., and deputed by that body to go to Danzig to settle a controversey between Hooke and Helvetius respecting the proper glasses for astronomical observations. In 1680, he made the tour of Europe, during which he made observations with Cassini at Paris on the great comet which bears H.'s name, and whose return he predicted. His observations on this comet

formed part of the foundation of Newton's calculation of a comet's orbit. H. returned to England, 1681, and published (*Phil. Trans.*), 1683, his theory of the Variation of the Magnet The next year, he made the acquaintance of Newton—the occasion being his desire for a test of a conjecture which he had made that the centripetal force in the solar system was one varying inversely as the square of the distance. He found that Newton had anticipated him both in conjecturing and in demonstrating this fact. For an account of H.'s connection with the publication of the *Principia*, see NEWTON. In 1686, H. published an account of the trade-winds and monsoons on seas near and between the tropics, which he followed by other chemico-meteorological papers. In 1692, he published his hypothesis relative to the change in the Variations of the Needle, to test the truth of which, by obtaining measures of the variations in different parts of the world, he was sent, 1698, in command of a ship to the western ocean; but his crew mutinied, and he was compelled to return. The next year, he sailed again on a similar expedition, and the result was given in a general chart, for which he was rewarded by the rank of capt. in the navy with half-pay for life. He made a chart of the tides in the channel, and surveyed the coast of Dalmatia for the emperor of Austria. In 1703, he was appointed Savillian prof. of geometry at Oxford; 1705, he published his researches on the orbits of the comets; 1713, on the death of Sir Hans Sloane, he became sec. of the Royal Soc.; 1716 he made valuable experiments with the diving-bell; 1720, after the death of Flamsteed, he became astronomer-royal. In this office, and engaged especially in studying the moon's motions, he passed the rest of his life. In 1729, he was chosen a foreign member of the Acad. of Sciences, Paris. He died at Greenwich. H. had married, 1686, a daughter of Mr. Tooke, auditor of exchequer, by whom he had several children. H.'s writings were numerous. His *Tabulæ Astronomicæ* did not appear till 1749. Among his principal discoveries were those of the long inequalityof Jupiter and Saturn, and of the slow acceleration of the moon's mean motion. He has the honor of having been the first who predicted the date of return of a comet, and also of having recommended the observation of the transits of Venus with a view to determining the sun's parallax—a method of ascertaining the parallax first suggested by James Gregory.

HALLEY'S COMET: see COMET.

HALL—HALLE, *hâl'lĕh*—HALLEIN, *hâl'līn:* names of various places in Southern and Middle Germany, possessing *salt-works*. *Hall* is also a general name for a salt manufacture. The Welsh and Armorican word for salt is *hal, halen;* hence it is inferred that these names were bestowed by Celtic tribes of the Cymric division (to which the ancient Gauls belonged). The Gaelic for salt is *sal-ann*, agreeing thus with the Lat. *sal*, and the Ger. *salz*. The Greek *hals* (ἅλς) agrees with the Cymric. The names Salza, Salzburg are clearly of Teutonic origin.

HALLIARDS, n. plu. *hăl'yĕrdz* [*hale*, or *haul*, and *yard*]: ropes or tackles, on their respective masts, for hoisting or lowering sails or yards.

HALLIWELL-PHILLIPPS, *hăl'ĭ-wĕl fĭl'ĭps*, James Orchard: 1820, June 21—1889, Jan. 1; b. Chelsea, England: author. He studied at Cambridge University, but did not graduate; began editing and publishing the old English authors and MS. texts 1839, was chiefly instrumental in purchasing Shakespeare's estate and organizing the Shakespeare Museum at Stratford-on-Avon 1863, assumed the name Phillipps by royal license 1872. He published *Shakespeariana* (1841), *History of Freemasonry* (1842), *Dictionary of Provincial and Archaic Words* (1844–5), *Life of Shakespeare* (1845), edition of *Shakespeare's Works*, 16 fol. vols. (1853–65), *Calendar of the Records of Stratford-on-Avon* (1863), *History of New Place* (1864), and *Outlines of the Life of Shakespeare* (5th ed. 1885).

HALL-MARK: a term used industrially to designate any official stamp that has been placed upon an object of trade to denote genuineness.

HAL'LOCK, Charles, American journalist and author: b. New York, 1834, March 13. He was graduated from Amherst in 1854, was editor of the New Haven *Register* in 1855–6, of the New York *Journal of Commerce* in 1856–61, of the St. John (N. B.) *Telegraph and Courier* in 1863–5. In 1873 he founded *Forest and Stream*, and in 1896–7 was editor of the *Northwestern Field and Stream*. In 1874 he founded the International Society for the Protection of Game. He did field-work and collecting for the Smithsonian Institution, and published numerous works, such as: *The Fishing Tourist* (1873); *Camp Life in Florida* (1876); *Vacation Rambles in Michigan* (1877); *Dog Fanciers' Directory* (1886); *The Salmon Fisher* (1890). He was a son of Gerard Hallock (q.v.).

HALLOCK, Gerard, American journalist: b. Pittsfield, Mass., 1800, March 18; d. New Haven, Conn., 1866, Jan. 4. He was graduated from Williams College in 1819, in 1824 founded the Boston *Telegraph* (united with the *Recorder* in 1825), in 1827 purchased a part interest in the New York *Observer*, and in 1828 became associated with David Hale on the *Journal of Commerce*. A leader in journalistic enterprise, he started (1833) a pony-express between Philadelphia and New York, and operated the Evening Edition, a schooner which met incoming ships at Sandy Hook, and brought foreign news. A pro-slavery man, he was a founder of the Southern Aid Society (1854), intended to succeed the American Home Missionary Society when the latter refused support to slave-holding congregations. In 1861 the *Journal of Commerce* was forbidden the use of the United States mails, and Hallock thereupon sold his

interest, and never afterward wrote for the press. He was a founder of the Associated Press.

HALLOCK, Joseph Newton, American Presbyterian clergyman and religious journalist: b. Franklinville, N. Y., 1834. He was graduated from Yale in 1857 and from the Yale Theological Seminary in 1860, and after holding pastorates of several Presbyterian churches became editor and proprietor of *The Christian at Work*. Among other works he has published *The Christian Life* (1890); *Family Worship* (1892); *What is Heresy?* (1894); *Mormonism* (1896); *Life of D. L. Moody* (1900).

HALLOO, or Halloa, n. *hăl-lô'* [OF. *halle*, an int. of cheering or setting on a dog: F. *hallali!* whoop! Low Ger. *hallo*, outcry: Sp. *jalear*, to encourage hounds to follow the chase]: a shout to attract attention: V. to cry loudly after; to shout to. Halloo'ing, imp.: N. a loud shouting. Hallooed, pp. *hăl-lôd'*. View-halloo, hunting-cry when the fox breaks cover.

HALLOW, v. *hăl'lō* [AS. *halgian*, to keep holy—from *halig*, holy]: to make holy; to consecrate; to honor as sacred; to devote to holy use. Hal'lowing, imp. Hallowed, pp. *hăl'lōd:* Adj. consecrated to a sacred use; treated as sacred. Hallowfair, n. *-fär*, in Scot., a market held in November. Halloween, n. *hăl'lō-ēn*, or Halloweven [*hallow*, and *even*]: popular name of the eve or vigil of All Hallows, or festival of All Saints. As the date of that festival is Nov. 1, Halloween is the evening of Oct. 31. In England, it was long customary to crack nuts, duck for apples in a tub of water, and perform other harmless fire-side revelries. Anciently the most essential ceremony appears to have been the lighting of a bonfire at nightfall by every household (see Beltane). In Scotland, the ceremonies partook more of a superstitious character; taking, among rustics, the form of a charm to discover who should be his or her partner for life. Of these now almost obsolete customs, the best summary is in Burns's well-known poem *Halloween*. See Brand's *Popular Antiquities* for some notice of old Halloween practices. Hallowmas, n. *hăl'lō-măs* [*hallow*, and *mass*]: the feast of All Hallows or All Saints, Nov. 1.

HALLOWELL, Me., city in Kennebec County, on the Kennebec River, and on the Maine Central railroad; two miles south of Augusta and four miles north of Gardiner. The first permanent settlement was made in 1754. It was incorporated as a township in 1771, and chartered as a city 1850, Aug. 29. At the time of its becoming a chartered city it included within its limits Chelsea, Manchester, and Farmingdale. The city is governed by a mayor and a council of seven members elected annually. It has two banks with a combined capital of $150,000. The industries of the city include granite works, shoe manufactories, glue works, cotton

goods, machinery, etc. The Hubbard Free Library and the Maine Industrial School are public institutions. Pop. 3,000.

HALL'STATT EPOCH, a name taken from the necropolis of Hallstatt, Upper Austria, not far from Salzburg, and applied to that culture in Europe—parts of Germany, France, Italy, and in Switzerland, Bohemia, etc.—distinguished as the last bronze and first iron stage, dating back at least as far as 1000 B.C. According to some ethnologists in the eastern highlands of the Alps this culture was of a higher evolution than that of a partially Oriental cast in the west during the Neolithic epoch.

HÄLLSTRÖM, Ivar, *ē'vâr hĕl'strėm*, Swedish composer: b. Stockholm 1826, June 5; d. there 1901, April 11. He studied law at Upsala, then turned his attention to music, in 1861–72 was director of the institute founded by Lindblad, and from 1881 instructor to the Royal Opera. His works include the operas *Den Bergagna* ('The Mountain King' 1874); and *Neaga* (libretto by Carmen Sylva, 1885); cantatas, numerous songs, and an *Idyle* for orchestra, chorus, and solo voices, for which he received (1860) a prize from the Stockholm Musical Union.

HALLUCINATION, n. *hăl-lô'sĭ-nā'shŭn* [F. *hallucination*—from L. *hallucĭnātĭonĕm*—from *halluc'ĭnor*, I wander in the mind]: perception without any real object to be perceived; in a loose sense, also, delusion; error; an erroneous or insane belief in the reality of things which have no existence. Hallu'cĭna'tory, a. *-nā'tėr-ĭ*, partaking of hallucination.

Hallucination is distinguished from Illusion (q.v.) by the fact that the latter is a wrong interpretation of an external object stimulating a sense organ, while the former is produced by no external stimulus. Ordinarily the victim of hallucination believes in the objective reality of the object, and constructs a system of beliefs about it, in which case the hallucination involves *delusion*.

Hallucination may occur in an otherwise normal experience; it may be sporadic or persistent; it may awaken credence and be woven into the structure of the life, or it may be recognized by its victim as an abnormal state of mind. Hallucinations affecting any sense may occur, but visual and auditory are more frequent than others. (In the sane, 60 per cent visual, 33 per cent auditory are figures given.) Hallucinations are produced by alcoholic intoxication, by many drugs, as opium, quinine, etc., by hypnotic suggestion; they occur in many diseases, as fever, and during physical exhaustion from thirst, starvation, disease. A large proportion of the insane suffer from hallucinations which have taken more or less complete possession of conscious-

ness, excluding contradictory ideas. A person having hallucinations usually shows other symptoms of mental deterioration. This is, however, not always the case, and there have been those who have even evinced belief in their hallucinations who have at the same time exercised good judgment, possessed education, and had capacity for carrying on the business of life well. Hallucinations are peculiarly responsive to beliefs, habitual trends of thought, and expectations. One may see what he desires to see so vividly that it assumes objectivity, clearness, and completeness,—i.e., all the characteristics of a true perception. The voices heard by Joan of Arc no doubt had an hallucinatory origin. Faust sold himself to a figment of his own disordered mind. 'Think of the devil and he will appear.' Since the ancients could assign no normal origin for hallucinations they were ascribed either to divine revelation, or to demoniac possession. The Delphic Oracle heard prophecies of the future only during epileptic seizures.

Psychology has not yet explained the cause and nature of hallucinations satisfactorily. The presence of toxines in the blood, congestion or disease of the sense organs or of the central system lead to hallucinations.

HALLUX, n. *hăl'lŭks* [L. *hallex*, the great toe]: the innermost of the five digits which compose the hind foot of a vertebrate animal; the great toe.

HALM, or Haulm, n. *hawm* [Ger. *halm;* Icel. *halmr*, a stalk, straw: OF. *chaulme;* F. *chaume*, straw—from L. *călămus*, a reed]: the stem or stalk of grain; the dead stems of herbs, as of the potato.

HALMALILLE, *hăl'ma-lĭl* (*Berrya amonilla*): tree of nat. ord. *Tiliaceæ* closely allied to the Lime or Linden tree of Europe, and much resembling it, but larger; native of Ceylon, much valued for its timber, which is a favorite house-building wood in that island, and is used also for carts, casks, and all household purposes, and for boat-building, as it is believed to resist the attacks of marine worms, and in virtue of a certain unctuosity, to preserve the ironwork from rust. It is exported to Madras—where, from the principal port of exportation, it is known as *Trincomali Wood*—and the Masula boats which brave the formidable surf there, are made of it. It is a light wood.

HALMSTAD, *hâlm'stâd:* town of Sweden, on the e. shore of the Cattegat arm of the North Sea, at the mouth of the Nissa river, 76 m. s.s.e. of Gothenburg. It was an important fortified post 1225, and its defensive works remained till 1736; was frequently chosen as the meeting place of the sovereigns of the three northern kingdoms; appointed as the place for the election of a new Scandinavian monarch whenever necessary; taken from Denmark by Gustavus Vasa 1534; ceded to Sweden 1660; and was the scene of the defeat of the Danes,

while trying to retake it, by Charles XI. 1676. It has a grand harbor constructed 1837—40, large salmon fisheries, and a valuable trade in lumber and pitch. Pop. (1901) 15,567.

HALO, n. *hā'lō* [F. *halo;* Gr. *halōs,* a halo]: a circle or ring of prismatic light around the sun or moon, distinct from a corona: see HALO—PARHELION—CORONA: in a *painting,* a bright ring around the head of a holy person; a glory or nimbus. HA'LOED, a. *-lōd,* surrounded by a halo.

HALOGEN ELEMENTS: often called *halogens* or *halides.* The term applied to the elements fluorine, chlorine, bromine and iodine, which form a group or family having many characters in common, but which also exhibit graduated differences. The order in which they are given above is the order of increasing atomic weight; when hydrogen =1, these are as follows: F=18.9, Cl=35.18, Br=79.36, I=126.01. It will be noticed that the atomic weight of bromine is practically equal to half the sum of the atomic weight of chlorine and iodine. Fluorine is difficult to condense, chlorine can be liquified easily, bromine is a liquid and iodine a solid under ordinary circumstances. In color a similar gradation is found, the first is light yellow, the second greenish yellow while the last two are red and black, respectively. In their chemical properties similar differences are noticed. They are the most strongly *negative* (q.v.) elements known. Fluorine is a very powerful oxidizing agent, iodine hardly shows this property at all, while the other two are intermediate in this respect. The same is true of the bleaching action of the elements in the presence of water, because this bleaching is really due to oxidation. The stability of the hydrogen compounds of these elements decreases on passing from fluorine to iodine, whereas that of their oxygen derivatives increases in the same order. The oxygen derivatives of fluorine are so unstable that they have never been isolated. As regards the compounds of these elements with metals, the same regularities hold. In general, the solubility and stability of a bromide is midway between that of the corresponding chloride and iodide. Certain fluorides form an exception to this regularity, probably because complex molecules (*ploymers*) (q.v.) are formed. From what has been said it will be seen that this family of elements forms a series very similar in many respects to the *homologous series* (q.v.) of compounds in organic chemistry. For fuller details regarding each element the separate articles dealing with them must be consulted. HALOGENOUS, a. *hă-lŏj'-ĕ-nŭs,* having the nature of a halogen. HALOID, n. *hā'lŏyd,* or HALOID-SALT [Gr. *eidos,* resemblance]: a salt-like compound produced by the union of one of the halogens with a metal: e.g. chloride of sodium (NaCl), bromide of silver (AgBr), fluoride of calcium (CaF_2), and iodide of potassium (KI).

HALOID. See under HALOGEN.

HALOM'ETER. See GONIOMETER.

HALO, *hā'lō*—PARHELION, *pâr-hē'lĭ-ŭn*—CORONA, *ko-rō'nâ*—etc.: various meteorological phenomena. (For Corona as an astronomical phenomenon, see CORONA.) It would not be easy even to enumerate the various distinct phenomena of the above classes: a few of the principal varieties are here indicated; though these illustrate the others, except as concerns mathematical relations.

One class of coronæ is very common. When the sun or moon is partially obscured by a mist or cloud, the latter *not* being of the species called cirrus (see CLOUD), it is almost invariably surrounded by colored rings of a few degrees only in diameter, called *Coronæ* (crowns). Those surrounding the sun cannot always be seen directly; but by reflection at the surface of still water, or of a glass-plate blackened at the back, the glare of the sun-light is sufficiently diminished to permit the corona to be seen. This meteor depends on the DIFFRACTION (q.v.) of light, caused by the small spheres or vesicles of water which compose the cloud, and can easily be imitated by looking at a bright object through a piece of glass which has been breathed upon, or dusted with Lycopodium seed. If the diffracting particles be all of the same size, the rings are well marked; but since they become smaller as the particles increase in size, ordinary fogs and clouds, which generally contain particles of very different dimensions, give a composite effect, which spoils the distinctness, and greatly limits the number of the rings. Thus, no general rule can be given for the number or colors of the coronæ, but it may be observed that their diminution in diameter is a sign of the increase in size of the watery spheres which cause them, and therefore in general betokens approaching rain, which comes when the particles are no longer able, on account of their size, to float in the air without sensibly falling.

A different form of corona is sometimes seen to surround the shadow of the spectator's head, when cast by the sun on a bank of fog—in this case it is sometimes called a *glory*. To this class belong the colors generally seen about the famous 'Spectre of the Brocken': see BROCKEN. The same appearances are frequently seen round the shadow of the spectator when it is thrown on muddy water, or water carrying numerous small particles of sand. The optical explanation, founded mainly upon reflection and interference, is complete, but not in place here.

So far the phenomena depend merely on the cloud or fog consisting of small particles; nothing has yet been said about the *shape* of the particles. Spherical *drops* of water produce Rainbows (q.v.), and upon the vesicular form which moisture often assumes in the air, probably depend the blue of the sky and the gorgeous

times of sunrise and sunset. But halos (Gr.) and parhelia (Gr. false or mock suns) depend on the presence in the air of innumerable *crystals* of ice, generally forming a light cirrus cloud. A general idea of the origin of these phenomena is given below. For thorough knowledge of the subject, consult a memoir by Bravais (*Journal de l'École Polytechnique*, XVIII.).

The theory of halos was first roughly attempted by Huyghens; but though his explanations are in the main correct (at least, as regards the simplest of the appearances), they are based on the utterly inadmissible supposition, that the halo-producing clouds are formed of cylinders of water, each having an opaque, frozen nucleus. It will be seen that the results of this supposition agree with those of the correct one in a few cases only. Further progress was impossible until the crystalline form and the refractive index of ice were observed. Both of these observations are of great difficulty; but they have been carried out by Wollaston and others with considerable accuracy. After Huyghens, Mariotte, admitting the crystalline form of ice-particles, made some great steps in advance, and much of what he left unexplained was successfully supplied by Young, and later by Kaemtz. The most complete and systematic explanation of the whole subject, however, is that of Bravais, above referred to. There, references are given to nearly all the accurately recorded observations of halos and parhelia—the great mass of which, of course, are due to arctic voyagers, especially Scoresby and Parry.

Water crystallizes in the form of regular hexagonal prisms, sometimes with plane ends perpendicular to the sides (as in Fig. 1), sometimes wth hexagonal pyramids as terminals (Fig. 2). There is also an immense variety of much more complex forms; but on the simpler and more common ones above mentioned, depend the ordinary cases of the phenomena here described. Now, if we consider any two non-parallel faces of one of the above crystals, it is clear that their combination must act as a prism, decomposing white light, which passes through them, into its constituent colors. Every such crystal, then, placed somewhere near the line joining the eye and sun, must in general send to the former some definitely colored ray from each effective pair of surfaces. The refractive index, however, of ice is such that no ray can pass through a prism of it whose angle is greater than about 99°·5: and we are therefore limited to pairs of faces whose inclination is not superior to this. The most important pairs are two *alternate* faces of the prism

Fig. 1.

Fig. 2.

(Fig. 1), where the inclination is 60°, and a face with a terminal plane (Fig. 1), the angle being 90°.

Halo of 22° Radius.—We may now suppose prisms of ice, with refracting angles of 60°, to be distributed (with every possible position of their axis) nearly between the sun and the spectator, and it is evident that the appearances produced must be symmetrical with regard to the line joining the eye and sun, and must therefore consist of colored circles with the sun as centre. To attain a more exact idea of the nature of these circles, suppose that we are dealing with light of one color only (say red). Now (see PRISM), if a beam of homogeneous light falls on a prism, it is refracted without separation. If the prism be turned gradually and uniformly about its axis, the refracted ray also turns, but *not* uniformly —at first rapidly, then slower, till it reaches a point at which it appears to be stationary for a little; then, on further turning the prism, the refracted ray *retrogrades*, at first slowly, then faster. There is therefore a position of the prism, called that of *minimum deviation*, for which a slight alteration of the prism produces none in the direction of the refracted ray. Hence, as we have supposed prisms to be in the cloud in every possible position, those which are near the position of minimum deviation will conspire to refract light in the *same* direction, and their effects will be added. All the others will cause a *greater* deviation of the light, but few will conspire to send the light in any given direction. The appearance will therefore be a bright circle of red light surrounding the sun as centre, its angular radius being the angle of minimum deviation, which for a prism of ice of 60° angle, is about 21° 50′. Inside this circle there will be *no* light; outside, a feeble illumination only, becoming fainter as we go further from the sun. With orange light alone, there would be a somewhat larger circle, and so on. Hence, when white lights falls on such a system, the effect is a circular halo, dark within, red on its inner edge, and with a mixture of more or less of the colors of the spectrum from inside outward; so that, like the rainbow, which it much resembles, it differs from the ordinary spectrum (q.v.).

If we consider next the light *reflected* from the surfaces of the prisms, this will be *white*, and diffused with approximate uniformity all about the sun.

But the prisms of Fig. 1 are not likely to be suspended in the air in all positions alike. If the prism be long and fine, it will have a tendency to fall end foremost, i.e., with its axis vertical, or (it may be) horizontal. If it be a flat hexagonal cake (a frequent form of snow), it will tend in the main to fall edgeways, so that, in addition to the halo which depends on the ice-crystals having every possible position, there are distinct phenomena depending on an excess of the crystals having their axes vertical or horizontal. If we consider the

sun as just rising or setting, it is plain that the right and left-hand portions of the halo will be much more strongly marked than the others, as these parts are formed by crystals whose axes are vertical, and which form the majority. There are therefore to right and left of the sun, and on the halo, bright-colored images of the sun, called *parhelia*, or mock-suns.

It is perhaps more difficult to explain to the non-mathematical reader the formation of parhelia when the sun is not on the horizon, and to show why they then separate from the halo, and are formed externally to it, still, however, at the same altitude as the sun. Suppose an indefinitely long vertical prism; rays of sunlight falling on this are separated, as before, but if the sun be not on the horizon, they no longer fall on the prism perpendicularly to its edge. Optics, however, show us that for this oblique incidence also there is a position of minimum deviation, and therefore one angular distance from the sun at which the effects of a great number of prisms conspire, while far fewer conspire at any other angle. It is also shown that this minimum angle is greater as the incidence is more oblique. Also the inclination of the incident and refracted rays to the edge of a prism is always the same, however the ray may fall. Hence, as the edges of the prisms in question are vertical, the refracted rays appear to come from a point at the same altitude as the sun, and, by what was remarked above, further from the sun as the sun is higher. Hence the formation of the parhelia consisting of two colored images of the sun, at the same altitude as that body, and further beyond the halo as the sun is higher. Accurate measurements of their distance from the sun for different altitudes have been found to accord exactly with the results of calculation from the optical data. See PP (Fig. 3).

The light *reflected* from the surfaces of the vertical prisms, of course appears to come from an image of the sun in a vertical mirror, which, by optical laws, must have the same altitude as the sun itself. Such images then form a *white* horizontal small circle, passing through the sun and the parhelia. This is often observed, and helps to corroborate the above theory of the colored appearances. See the dotted line PSP (Fig. 3).

The light reflected from the horizontal terminals of these prisms must evidently produce a single white image of the sun, as much below the horizon as the sun is above it, and *vice versâ*. This appearance also is frequent.

Tangent arcs to the halo of 22°.—We have seen that in many cases the prisms of ice are so short as to be hexagonal plates. Their natural position in falling will be edge foremost, or there will be a multitude of snow-crystals whose axes are nearly horizontal, but of course arranged in all directions in the horizontal plane. Let

us consider first all those whose axes are perpendicular to the line joining the spectator with the sun; these evidently (by an explanation similar to that of the parhelia given above) form parhelia *on* the halo at its upper and lower points. Another set, whose axes also are nearly horizontal and parallel, but slightly inclined to the former, will form parhelia to one or other side of the vertical plane passing through the sun, and on account of the obliquity of the incidence, the angle of deviation is increased, and these are *outside* the halo. They are further to the right or left of the sun's vertical plane, and further outside the halo as the crystals are more and more turned in their horizontal plane. The complete result is a brightly colored pair of arcs, which *touch* the halo at its upper and lower points, and lie completely outside. For certain elevations of the sun, these combine, forming a curve like an ellipse, whose centre is the sun, whose larger axis is horizontal, and which touches the halo externally at its upper and lower points.

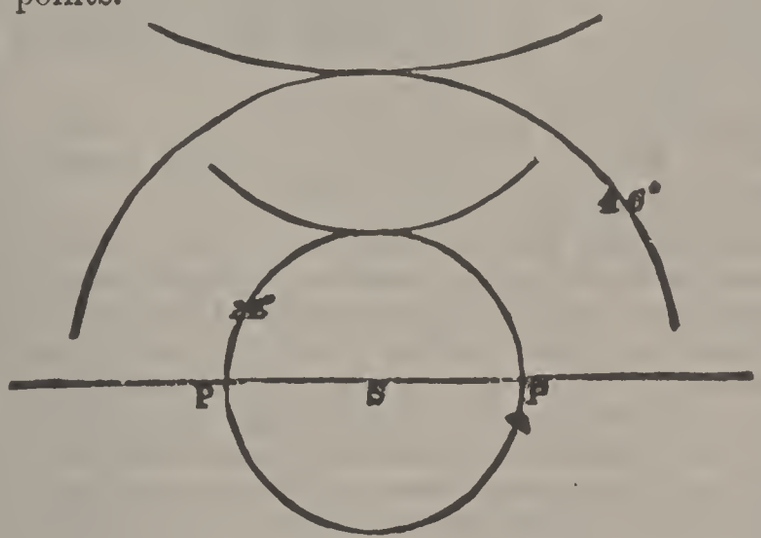


Fig. 3.

Halo of 46°.—This depends on the right-angled prisms, formed by combining a terminal plane with one of the faces of the hexagonal prism; and with the single exception of a different refracting angle, and its consequent greater dimensions, its explanation and its appearance are the same as those of the halo of 22°.

Perhaps the most magnificent, both for brightness and separation of colors, of all the halos, is the colored arc which touches the halo of 46° at its upper point. This depends entirely upon the refraction of light through the upper edges of prisms similar to Fig. 1, and whose axes are *vertical*. It is therefore due to the same cause as the parhelia of the halo of 22°; and it is a remarkable proof of this, that there is but one instance recorded in which the former appeared without the latter; and its absence was then easily accounted for by there being no cloud of ice-crystals near enough to the sun to produce the parhelia. See Fig. 3.

There are also sometimes seen brightly colored arcs touching one on each side the lower half of the halo of 46°. They are explained by the right angles of prisms whose axes are horizontal. Again, a parhelion being itself a source of light, sometimes very intense, may have *its* surrounding halos of 22°, etc. All phenomena of the latter class are termed *secondary*. They are in general, as might be expected, much fainter than the *primary* ones, but in favorable circumstances have been distinctly observed.

Other phenomena, easily predicted mathematically but unfitted for verbal explanation, are due to various combinations of planes of the hexagonal pyramid (Fig. 2) with each other, or with planes of the prism.

Accompanying is a rough geometrical sketch of an approximately complete set of halos observed by Bravais, in Sweden, 1839. The marks on the sketch indicate to which of the classes above mentioned the various portions belong. The celebrated cross which Emperor Constantine saw in the heavens, abt. A.D. 313, and which led to his conversion from paganism, may have been part of a system of solar halos, two of which at right angles would form a cross.

HALOPHYTES, n. plu. *hăl'ō-fītz* [Gr. *hals*, the sea; *phŭton*, a plant]: in *bot.*, plants of salt marshes, containing salts of soda in their composition.

HALORAGIACEÆ, *hăl-o-rā-jĭ-ā'sē-ē*, or HALORAGEÆ, *hăl-o-rā'jē-ē:* nat. ord. of exogenous plants closely allied to *Onagraceœ* (q.v.).—There are about 70 known species, herbaceous or half-shrubby, scattered over the world, but almost all aquatic, or growing in wet places. The stems and leaves often have large air-cavities. The flowers and plants are generally small, and none have important uses except those of the genus *Trapa* (q.v.). Mare's Tail (*Hippuris vulgaris*) and Watermilfoils (*Myriophyllum*) are two of the species.

HALOSCOPE, *hā'lo-skōp:* a beautiful optical instrument invented by Bravais, of France, for exhibition of all phenomena connected with halos, parhelia, etc. It consists of a vertical axis, with a clock movement for the purpose of giving it rapid rotation; two glass prisms, one hollow to contain water; two opaque plates of glass to obscure one or two sides of the prisms, as required in different experiments; a quadrangular prism; and a small arm carrying a mirror: this last and the three prisms all are adapted for mounting on the axis. To imitate the parhelion, the vertical axis with the solid glass prism is set in rapid rotation in a darkened chamber, with a candle 10 or 12 ft. distant, but with the flame on the same plane as the rotating prism; two sides of the prism are to be obscured with the movable opaque slides of glass. The spectator then looks horizontally at the revolving instrument, and sees the parhelion circle.

Different dispositions of the apparatus produce the allied phenomena.

HALOTRICHITE, n. *hă-lŏt'rĭ-kīt* [Gr. *hals*, salt; *thrix*, hair; *trichos*, of hair]: an iron alum, a mineral occurring in fibrous silky masses of a yellowish-white color.

HALPINE, *hăl'pĭn*, Charles Graham: 1829, Nov. 20—1868, Aug. 3; b. Oldcastle co. Meath, Ireland: author. He graduated at the Univ. of Dublin 1846; began as a journalist; removed to New York 1847, and for several years was employed on the *Herald*, *Times*, and *Tribune* in New York, and the *Post* and *Carpet Bag* in Boston. He entered the Union army 1861, and, after an executive service of high merit, resigned with the rank of brevet brig.-gen. 1864. Returning to New York, he resumed editorial labor, and was elected register of the co. 1867. He was author of the poem *Tear Down the Flaunting Lie;* of many popular pieces in prose and verse over the pen-name *Miles O'Reilly* during the civil war; *Life and Adventures, Songs, Services, and Speeches of Private Miles O'Reilly, 47th Regiment, New York Volunteers* (1884), *and Baked Meats of the Funeral; a Collection of Essays, Poems, Speeches, and Banquets by Private Miles O'Reilly*, etc. (1866).

HALS, *hâls*, Frans: 1584–1666, Aug. 20; b. Antwerp: painter. He was a member of one of the Dutch milit. guilds, of the chamber of rhetoric, and chairman of the painters' corporation of Haarlem 1644. Through unfortunate personal habits, he was brought to absolute penury; and after paying his rent and fuel some time, the municipality gave him an annuity 1664. As a painter, he has been ranked immediately after Rembrandt and Vandyke, and was considered far more expressive than the former. There are portraits by Hals in many continental galleries, though few have found their way to England or the United States. His sitters were taken from every class of society; and he seemed to delight in painting fishwives and boys and girls playing, singing, and laughing.—His son, Frans Hals (1622–69), was a painter of scenery and animal life, chiefly cottages and poultry; and one of his best works is the *Vanitas* at Berlin.—Frans's brother, *Dirk Hals* (d. 1656), also a painter, showed much of the freedom of the elder Frans, though following an entirely different form. He revelled in festivals, ball-rooms, and scenes of gayety, and in this line is ranked second to Palamedes. The acad. at Vienna contains a striking example of his work—a company of gentlefolk rising from dinner.

HALSE, n. *hawls*, or Hawse, n. *hawz* [Ger. Dut. *hals*, the neck: Dut. *halsen*, to take one by the neck, to embrace]: in *OE.*, the neck: V. to take one by the neck; to embrace. Hals'ing, imp. Halsed, or Halst, pp. *hawlst*. Haws'ing, imp. Hawsed, pp. *hawzd*.

HALSE, Halser. See Hawse.

HALSTEAD, *hawl'stĕd*, Murat: journalist: b. Paddy's Run, Butler co., Ohio, 1829, Sep. 2. He was bred to farm life, graduated at Farmers' College, near Cincinnati, 1851; became local reporter on the Cincinnati *Enquirer;* established a Sunday newspaper in Cincinnati; began reporting on the Cincinnati *Commercial* 1853, bought an interest in the paper 1854, became editor-in-chief 1856, proprietor 1867, and, on the consolidation of the *Commercial* and the *Gazette* 1882, became pres. of the company and chief editor. Though supporting the policy and measures of the republican party, he has been a fearless, independent writer; and his severe criticisms on some of the party's highest leaders caused his rejection by the U. S. senate when nominated by President Harrison to be U. S. minister to Germany 1889, April. In 1890 he removed to Brooklyn, N. Y., where he edited the *Standard Union.* Later he was a contributor to magazines and special correspondent, and in the latter capacity went to the Philippines during the Spanish-American War. He wrote: *The Story of Cuba; Life of William McKinley; The Story of the Philippines; History of American Expansion; Life of Admiral Dewey; The Boer and British War; Our Country in War; Official History of the War with Spain; The Great Century; The Galveston Tragedy; The War Between Russia and Japan* (1905); etc.

HALT, a. *hawlt* [Goth. *halts;* Icel. *halltr,* lame: Norw. *haltra,* to halt, to go lame]: lame; crippled: N. the act of limping: V. to limp from lameness; to hesitate; to falter. Halt'ing, imp.: Adj. limping: N. act of one who halts. Halt'ed, pp. Halt'er, n. one who. Halt'ingly, ad. *-lĭ.*

HALT, v. *hawlt* [Ger. and Sw. *halt,* hold, stop: F. *halte;* OF. *halt,* a halt—connected with above]: to cease marching; to stop; to make a stand: N. a stopping; a stop in marching. Halt'ing, imp. Halt'ed, pp.

HALTER, n. *hawlt'ẽr* [O.H.G. *halftra;* Dut. *halfter,* a halter: Bav. *halfter,* a pair of braces]: a rope or strap for leading or confining a horse; a rope to hang criminals: V. to bind or catch with a halter. Halt'ering, imp. Halt'ered, pp. *-ẽrd.*

HALTERES, n. plu. *hăl-tē'rēz* [Gr. *haltērēs,* masses of lead held in the hands to balance leapers]: the rudimentary filaments or balancers which represent the posterior pair of wings in the order of insects called the *diptera.*

HAL'VANS, n. *hăl-vănz:* impure ores which require to be washed and freed from impurities.

HALVE, v. *hâv* [from *half,* which see]: to divide into two equal parts. Halv'ing, imp.: N. a method of joining timbers by letting them into each other. Halved, pp. *hâvd.* Halves, n. *hâvz,* the plu. of *half:* Int. expression by which a person familiarly lays claim to an equal share of a thing. To go halves, to share equally.

HALYARDS, or HALLIARDS, n. plu., *hăl'yĕrdz* [*hale* or *haul*, and *yard*]: the smaller ropes and tackle used in hoisting sails or other portions of a ship's equipment. The signal halyards are running-cords of the best white hemp, passing through a pulley in the truck at the mast-head or gaff-point, and thence to the deck; the flags when attached to them, are rolled up, and then hoisted and expanded to the wind by a jerk.

HALYBURTON, *hăl'ĭ-bĕr-ton*, THOMAS: Scotch Presb. clergyman: 1674, Dec. 25—1712. He studied at Rotterdam, then at Perth and Edinburgh, and 1692 entered the Univ. of St. Andrews. He was ordained, 1700, in the parish of Ceres, and was appointed 1710 to a professorship of theology in St. Andrews. He was author of several works, including *Natural Religion Insuffieient, and Revealed Neeessary to Man's Happiness; The Great Coneern of Salvation;* and *Ten Sermons preaehed before and after the Celebration of the Lord's Supper.* The works, especially the autobiographic memoir, of the 'Holy Halyburton' were formerly very popular in Scotland, and still are greatly relished by persons of a serious disposition. These books, which are among the best of this class, were published, with an Essay on his Life and Writings by Robert Burns, D.D. (London 1835).

HALYSITES, n. plu. *hăl'ĭ-sīts* [Gr. *hălŭsĭs*, a chain]: in *geol.*, chain-pore coral.

HA'LYS RIV'ER. See KIZIL TEREK.

HAM, n. *hăm* [Icel. *höm*, the back parts or rump: Fin. and Dan. *humma*, or *homme*, a cry to keep a horse quiet, or to make him back—see next entry]: the back part of the thighs. HAMSTRINGS, the strong sinews at the back of the knee. HAM'STRING, v. to cut the strong sinews of the leg, and thus to disable or lame. HAM'STRINGING, imp. HAM'STRUNG, pp. *-strŭng*, disabled by having the strong sinews of the leg cut.

HAM, n. *hăm* [Bav. *hammen;* Dut. *hamme*, ham; Sp. *jamon;* F. *jambon*, ham—from F. *jambe*, a leg]: properly, the hind part or angle of the knee, but usually applied to the cured thigh of the ox, sheep, or hog, especially the hog. Ham-curing, or, what is the same thing, bacon-curing, is performed in a variety of methods, each country or district having its own peculiar treatment; these, however, relate to minor points. The essential operations are as follows: The meat is first well rubbed with bay-salt, and either left on a bench that the brine may drain away, or covered in a close vessel; after a few days, it is rubbed again, this time with a mixture of salt and saltpetre, to which sugar is sometimes added, or with a mixture of salt and sugar alone. It is then consigned to the bench or tub for at least a week longer, after which it is generally ready for drying. *Wet salting* requires, on the whole, about three weeks; *dry salting*, a week longer. Mutton-hams should

not be kept in pickle longer than 12 or 14 days. Some hams are merely hung up to dry without being smoked; others are removed to the smoking-house, which consists of two and sometimes three stories. The fire is kindled in the lowest, and the meat is hung up in the second and third stories, to which the smoke ascends through holes in the flooring. The fire is kept up with supplies of oak or beech chips, though in some districts, as in Westphalia, twigs of juniper, and, in many parts of Great Britain, peat, are used. Fir, larch, and such kinds of wood impart an unpleasant flavor, and are on no account to be used. The fire must be kept smoldering night and day for about six weeks, at the end of which time, if the ham be not more than five or six inches deep, it is perfectly cured. The efficiency of wood-smoke in preserving meat is due to its pyroligneous acid (q.v.): see also CREASOTE. Cold weather is preferable for this operation. In regions where wood and peat are used for fuel, hams are smoked by hanging them up inside the large, wide chimneys. Westphalia has long been celebrated for the delicacy and flavor of its smoked hams. The curing of hams has been brought to great perfection in the United States, in establishments where it is done on an immense scale.

HAM, *ŏng:* small town and fortress of France, dept. of Somme, on the river Somme, 36 m. e.s.e. of Amiens, about 70 m. n.n.e. of Paris. It is of ancient origin: coins were struck here in the reign of Charles the Bald (840–877). The seigniory, or lordship, of Ham, erected into a duchy 1407, was held by the families of Courcy, Orleans, Luxembourg, and Vendome. The town is noteworthy for its old fortress, or castle, built by the Constable de Saint-Pol 1470, and now used as a state prison. Its walls are 39 ft. thick, and its principal tower 108 ft. in height, and the same in diameter. It is memorable as the place of confinement of Marbœuf, Moncey, and others, and, subsequently, of Polignac, Chantelauze, Peyronnet, and Guernon Ranville 1831–36, and of Louis Napoleon, late emperor, 1840–46. After the *coup d'état*, 1851, Dec. 2, the republican generals Cavaignac, Lamoricière, Changarnier, and others were kept here for some time. Pop. 3,500.

HAM, *hăm:* second of the three sons of Noah, and brother of Shem and Japheth (Gen. v. 32). The word is derived by Gesenius from the Heb. *Hamam*, 'to be hot.' His descendants are represented in the biblical narrative as peopling the southern regions of the earth—Arabia, the Persian Gulf, Egypt, Ethiopia, Libya, etc. The Coptic, or native, name of Egypt is *Kemc* or *Chemi*, sometimes supposed to be the same word as Ham, and signifying both black and hot. In the hieroglyphic language, the name of Egypt is expressed by the two letters K. M. In the Rosetta Inscription, the word is read by Champollion, *Chmé*. This identification is not

satisfactory to Lepsius and other authorities, who, while not denying that the term Ham included Egypt (Ps. cv. 23; cvi. 22), view it as having had primarily a much wider application. Modern ethnologists regard the Hamitic races as intruders from Asia, like the Semites (with whom they may originally have been allied), though known to history in Africa only. They differ widely from Negroes, Bantus, Fulahs, and Hottentots. They occupied the Nile Valley, the e. coast of Africa, and parts of the Sahara. They include the ancient and modern Egyptians, ancient Libyans, Numidians, and Gaetulians, with the tribes or peoples now speaking Berber or Kabyle dialects, Tuaregs, also Somalis and Gallas. Their languages were or are akin.

HAMADAN, *hâ-mâ-dân′:* important town of Persia, province of Irak Ajemi, agreeably situated at the n. base of Mount Elwund, 180 m. w.s.w. of Teheran; lat. 34° 50′ n., and long. 48° 28′ e. Its streets are narrow and dirty; but trade and manufactures are extensive. It contains numerous caravansaries, excellent and well-furnished bazaars, gardens, baths, and mosques, as well as two notable tombs, one that of the famous Arabian philosopher and physician Avicenna (q.v.), which draws numerous pilgrims to the town; and the other affirmed to be that of Mordecai and Esther. During four months in winter, the cold here is excessive, and fuel with difficulty procured; through the rest of the year, the climate is delightful. Being the centre of converging routes from Bagdad, Erivan, Teheran, and Ispahan, it is the seat of a large transit trade. Hamadan has extensive manufactures of leather; coarse carpets, woolen and cotton fabrics also are made. Recent explorers have concluded, from historical evidence, and from the coins, inscriptions, and other remains found here, that Hamadan occupies the site of the Median Ecbatana (q.v.). Pop. variously estimated 10,000–40,000.

HAMADRYAD, n. *hăm′ă-drī′ăd* [L. *hamādryăs*—from Gr. *hama*, together; *drus*, an oak]: a wood-nymph attached to a particular tree, and whose existence depended on that of the tree to which she was attached: see NYMPHS.

HAMADRYAS, n. *hăm-a-drī′as:* in *zool.*, species of the genus *Cynocephalus*. See BABOON.

HAMAH, *hâ′mâ*, (*Hamath* of the Bible; Gr. *Epiphania*): city of Syria, 120 m. n. of Damascus. The town is built on both sides of the Orontes, here crossed by four bridges. A number of huge wheels, turned by the current, raise the water into aqueducts for supply of the town. The town is inclosed by walls, and the houses are built in the Damascus style, of sun-dried bricks and wood. The principal structures are the governor's palace, many mosques, baths, bazaars. There are manufactures of silk, cotton, and woolen fabrics, gold and sil-

ver thread. Hamah ranks among the oldest cities in the world; it was a noted place, and the capital of a little kingdom, when the Israelites came out of Egypt; and its name is of frequent occurrence in the Old Testament. Pop. 30,000.

HAMAM'ELIS—HAMAMELIDEÆ. See WITCH-HAZEL.

HAMANN, *hâ'mân*, JOHANN GEORG: original thinker and author, by some of his friends called the 'Magus of the North': 1730, Aug. 27—1788, June 21; b. Königsberg Prussia, of a humble family. His early life was not fortunate; and a failure to acquit himself creditably in some business with which a friend, a merchant of Riga, had intrusted him, induced him to abandon himself to dissipation, from which he was rescued by reading the Bible. He then studied the ancient languages and Oriental literature, and read many eminent authors. He died at Münster. As an author, Hamann was little esteemed by the mass of his contemporaries, as he opposed the tendencies of the age, and defended the dignity of revelation against the attacks of the Rationalists, and developed Christian faith into an extreme pietism—thus placing himself in opposition to the multitude of scholars. His language, besides, was figurative and symbolical in the highest degree, and frequently concealed rather than revealed the depth of his thinking. He was also unstable in purpose, unpractical in affairs, and not well capacitated for abstract thought. But his unmistakable genius, and the occasional rich suggestiveness of his ideas, were appreciated highly by Herder, Goethe, Jacobi, Jean Paul, and other great men. His influence on Herder's views was very great. All his writings evince a deeply spiritual faith in the unseen and the eternal. Fragments were published by Cramer, under the title *Sibyllinische Blätter des Magus aus Norden* (Leip. 1819), and his *Sämmtliche Werke*, by F. Roth (7 vols. Berlin 1821–25; an 8th vol., published by G. A. Wiener, Berlin 1843, contains additions and explanations). His biography was published by E. H. Childemeister (*Hamann's Leben und Schriften*, 6 vols. 1857–73), and by Poel (2 vols. 1874–76).

HAMÂSAH, *hâ-mâ'sah* (correctly, HAMÂSEH); Arabian anthology, named from the title of its first book, and compiled by Habib ibn Aus et-Tai, surnamed Abû Temman. It consists of 10 books, or parts, embracing 884 complete or partial poems, selected from the works of Arab poets from remotest periods till the time of the compiler, though more fully representing the poets of the anti-Islamic time, the early days of El Islam, and of the period A.D. 660–749. The latest date that can be ascribed to any of the poems is A.D. 832. The compiler was a distinguished poet in the style of his day, and noted as a traveller. He is credited with having compiled or composed five poetical works, one of which was

the Hamâsah, while temporarily residing in Hamâdan; and the Hamâsah was long held as an heirloom in the family of his host. Many commentaries have been prepared on it, and a skilful and spirited translation into German was published by Friedrich Rückert (Stuttgart 1846). The character of this storehouse of ancient legend will readily appear from the title of the books, viz.: (1) *El-Hamâseh*, 261 pieces; (2) *El-Marâthi* (dirges), 169; (3) *El-Adab* (manners), 54; (4) *En-Nesib* (beauty and love of women), 139; (5) *El-Hijâ* (satires), 80; (6) *El-Adyâf wa-l-Medih* (hospitality and panegyric), 143; (7) *Es-Sifat* (miscellaneous descriptions), 3; (8) *Es-Seyr wa-n-No'âs* (journeying and drowsiness), 9; (9) *El-Mulah* (pleasantries), 38; (10) *Medhemmet-en-nisâ* (dispraise of women), 18.

HAMATE, a. *hā'māt* [L. *hamātŭs*, hooked, crooked—from *hāmus*, a hook]: hooked· entangled. Ha'mated, a. hooked or set with hooks.

HAMATH. See Hama.

HAM-BEETLE, or Paper-worm: a small clerid beetle (*Necrobia rufipes*), sometimes a pest of considerable importance because of the occurrence of its larvæ or 'worms,' the paper-like cocoons and beetles on hams in such numbers as to render them unmerchantable. Its injuries are generally confined to the exterior and are due to carelessness in packing and to the cracking of the ham coverings. This is one of three cosmopolitan species of the same genus, all of which are carnivorous scavengers. It is a small, and rather slender beetle, dark-blue in color, and has reddish legs.

HAM'BLIN, Joseph Eldridge, American soldier: b. Yarmouth, Mass., 1828; d. New York, 1870, July 3. Not long after the commencement of the Civil War, he became adjutant of the 5th New York, later was transferred to the 65th, whose commander he soon became, and with which he participated in Sheridan's victorious movements in the Shenandoah. For services at Cedar Creek he was brevetted brig.gen., and was mustered out in 1866 with full rank of brigadier and brevet of maj.-gen. Subsequently he was active in the affairs of New York State National Guard.

HAMBLIN, Thomas Sowerby, American actor: b. Pentonville, near London, England, 1800, May 14; d. New York, 1853, Jan. 8. He was early a member of the corps of the Sadler's Wells and Drury Lane theatres, was a tragedian at Bath, Brighton, and Dublin, came to the United States in 1825, appeared at the Park Theatre, New York, and acted in leading American cities. He was manager of several New York theatres, and among his rôles were those of Macbeth, Hamlet, Othello, Rolla, Pierre, Virginius, and Coriolanus. He was esteemed second only to Forrest and the elder Booth, and made the standard drama a feature of his management, under which the Bowery Theatre saw its historic days.

HAMBURG.

HAMBURG, *häm'bürch:* the largest of the former free cities of Germany, and the last to retain the position of a free city—having ceased to be such 1888, Oct. (see FREE CITIES). It is in lat. 53° 32′ n., and long. 9° 58′ e.; on the n. bank of the Elbe, at its junction with the small streams of the Alster and the Bille; about 75 m. from the German Ocean. H. was founded by Charlemagne 804, but its commercial history began in the 13th c., when Emperor Frederick I. granted it the free navigation of the Elbe from the city to the sea, with the right of levying a toll on foreign shipping. These privileges were confirmed by his son, Otho IV., who raised H. to the rank of a free city. In 1241, H. joined with Lübeck in the formation of the Hanseatic League (q.v.), and from that time increased rapidly in wealth and commercial importance, augmenting its territory by the purchase of the township of Ritzebüttel, at the mouth of the Elbe (where the harbor of Cuxhaven is now situated), and several villages and islands in the vicinity of the town. Under the protection of the German emperors, H. soon became powerful enough to defend itself and its commerce both by sea and land, and carried on war for a considerable period against the Dutch and the Danes, though with varying success. It early embraced the doctrines of the Reformation, and, in consequence of the vigorous administration of its affairs, never had an enemy within its walls during the stormy period of the Thirty Years' War. The frequently recurring disputes with Denmark ceased 1768, when that power renounced al claim to any portion of the H. territory. The prosperity of the city increased until 1799, when a great commercial crisis occurred, followed 1806 by its occupation by the French, which, with a few interruptions, lasted till 1814. During this period, the town was strongly fortified, it being Napoleon's intention to make H. the stronghold of his power in n. Germany. The sufferings of the citizens were very great, and their losses were estimated at more than $50,000,000. Their miseries culminated in the siege which the French under Davout sustained from the Russians in the winter of 1813–14, when 30,000 people were driven out of the town, many of whom perished of cold and hunger. In 1815, H. joined the German Confederation, and was favored with a return of its former prosperity until the terrible fire of 1842, by which, within three days, one-third of the city was destroyed, with great loss of life and property. The fire was, however, not an unmixed evil, for advantage was taken of the opportunity to reconstruct that portion of the town, which by its broad, well-lighted, and well-drained streets, and fine and lofty houses, offers a striking contrast to the remaining part, much of which is occupied by wholesale business, and intersected by canals communicating with each other and with the river, by which goods are conveyed in lighters to and from the warehouses. The old ramparts have been converted into gardens and walks, and the beauty of the city is greatly increased by two large sheets of water formed by the Alster, and surrounded by good hotels and

private houses, many of which, in the suburb of Uhlenhorst, about two m. from H., are very charming.

There are several fine buildings, of which the exchange —where 4,000 merchants and others meet daily—and the picture-gallery are the principal. Among the churches, the principal are: St. Nicholas's, built from designs by Sir Gilbert Scott, at a cost of $1,000,000, as a memorial of the fire of 1842, a very fine Gothic building, with one of the loftiest spires in Europe (483 ft.); St. Michael's, built in the 18th c., in the Renaissance style, also distinguished by a lofty spire (432 ft.); and St. Catharine's, interesting from its age, being one of the few churches that escaped the fire.

H. is the commercial emporium of n. Europe, and has recently been connected by bridges across the n. and s. branches of the Elbe with Harburg in Hanover, by which direct railway communication has been obtained with the city of Bremen, and the route to Paris shortened by several hours. Great facilities have been given for the loading and discharging of steamers by the recent construction of extensive quays furnished with steam-cranes, warehouses, and communication by rail with the whole of the continent. Under favorable circumstances vessels drawing 18 ft. can go up to the harbor at high tide. H. is one of the largest coffee-marts, and, next to London, has the largest money-exchange transactions, in Europe. As a commercial centre, it is surpassed only by London, Liverpool, Glasgow, and New York—being the chief on the continent of Europe. The manufactures of H. are unimportant compared with its commerce, and are estimated not to exceed $12,125,000 in value per annum. The principal are cigar-making, distilling, sugar-refining, brewing, meat-curing, engineering, iron-founding, ship-building.

The exports of H. by sea in 1901 approximated 4,695,469 tons, valued at $454,886,750; the imports by sea in the same year were about 9,701,346 tons, valued at $540,177,750. Raw materials, food stuffs, coffee, and manufactured articles are the chief imports, the last item also constituting the larger portion of the exports. Since the establishment of the Hamburg giro-bank in 1619, the banking, exchange, and marine assurance business of this city has been conducted on a very extensive scale. Manufacturing interests, though large, are less important, and include ship-building, iron-foundries, tobacco and cigar manufacturing, sugar-refining, distilleries, breweries, and other domestic industries. The chief importance of H. is due to its great maritime commerce, which has been facilitated by the engineering enterprises of the inhabitants in deepening the bed of the river, cutting canals, and the construction of enormous docks at the mouth of the river. The tonnage of the mercantile navy of H. is nearly as large as that of all the vessels of Holland. In one year, ships and cargoes to the value of $500,000,000 have been insured at H.

The charitable institutions are numerous and well en-

dowed. There are a great many societies and asylums for the relief or reception of various classes, and the poor in general are well cared for. The general hospital has accommodation for 1,800 patients, and there is a smaller hospital in connection with the sailor's home. The Rauhes Haus (q.v.), near Hamburg, is very successful in reforming depraved children. There are several excellent schools, including the Gymnasium (founded 1528), a Realschule, a trade-school, a school of navigation, and a school of art. There are two large public libraries, an observatory, botanical and zoological gardens—the latter large, and laid out with great taste; there are also two large and several small theatres, and a great number of public gardens and places of amusement.

The sewerage system has been modernized, and the general sanitary conditions improved, especially since the severe choleraic epidemic of 1892. The municipal waterworks, dating from 1531, have been added to at various dates and a modern filtering plant installed since 1893; municipal bath and wash houses are maintained; food adulteration is keenly looked after; the gas and electric lighting plants are civic property; and a large revenue is obtained from the electric street railroads, which are operated by private companies, paying state subventions.

In 1866 Hamburg became a member of the N. German Confederation, and is now one of the states of the empire, sending three members to the imperial parliament at Berlin. The township of Bergedorf, 10 m. s.e. from Hamburg, formerly held jointly with Lübeck, became the sole property of Hamburg 1868, and the whole territory covers an area of 157 English sq. m. For several years after the restoration of the empire, Hamburg remained a free port as in the time of the Zollverein, the outlying portions of its territory being, as before, without the free-trade limit; but in 1881 negotiations were completed for making Hamburg subject to the same economical conditions as the rest of the empire (part of the city's debt being thrown on the imperial treasury). Although Hamburg retains the management of its local affairs, the independent position formerly held by the republic ceased 1866; consequences of this being the abolition of the Hamburg flag, and the withdrawal of its consular and diplomatic representatives in foreign countries, in addition to compulsory service for three years in the army or navy by all young men liable to military duty. The nominal status of a free city was retained till 1888. The city-state has a democratic constitution and is administered by an executive senate of 18 life-members, including a first and a second burgomaster elected biennially among the members, and by the legislative House of Burgesses composed of 160 members elected every six years, one half of whom retire every three years. Pop. (1900) 795,738.

HAMERLING, *hâ'mĕr-ling*, ROBERT: poet: b. Kirchberg, Austria, 1830, Mar. 24; d. 1889, July 13. He received a classical education in the gymnasium at Vienna, and graduated at the univ. there; became a chorister, then student of medicine, philology, and philosophy; was appointed a prof. at the Trieste Gymnasium 1855; retired on a govt. pension 1866; and subsequently lived near Graetz. His first work that attracted attention was *Amorous Reveries and Chants* (1859, 75); this was followed by *Little Poems* (1862, 73); *Venus in Exile*, symphony; *Ahasuerus in Rome*, epic (1866, 75); *The King of Zion* (1868, 74); *Danton and Robespierre*, tragedy (1871); and *Aspasia*, romance of the time of Pericles (1876).

HAMERTON, *hăm'ĕr-ton*, PHILIP GILBERT: landscape painter and author: b. Laneside, Lancashire, England, 1834, Sep. 10; d. 1894, Nov. 5. He received a grammar-school education, and was prepared for Oxford Univ., but a taste for the fine arts led him to study landscape painting; and a later taste for literature made him better known as an author than as a painter. He spent the greater part of his life in Scotland and France; was art critic of the *Saturday Review* 1866–68; contributed to the *Fine Arts Quarterly Review* and the *Fortnightly Review;* started *The Portfolio*, 1869; was elected an hon. member of the Soc. of Painter-Etchers; and received the univ. decoration of *Officier d'Académie* from the French govt. 1882. His published works include: *Observations on Heraldry* (1851); *The Isles of Loch Awe, and Other Poems* (1855); *Painter's Camp in the Highlands* (1862); *Thoughts About Art* (1862); *Etching and Ethers* (1868); *Contemporary French Painters* (1868); *Painting in France after the Decline of Classicism* (1868); *Wenderholme*, novel (1869); *The Unknown River* (1870); *The Intellectual Life* (1873); *Round my House* (1876) *Marmorne*, anonymous novel (1878); *Modern Frenchmen* (1878); and *Landscape*, beautifully illustrated (1885).

HAMES, n. plu. *hāmz*, or HAUMS, n. plu. *hawmz*, and HEAMS, n. plu. *hēmz* [Wal. *hène*, a split or thin piece of wood: Flem. *haem*, a horse-collar: OF. *eschames*, laths, shingles]: the two long pieces of wood or iron put on each side of the collar which surrounds the neck of a working

horse or ox, having the ends projecting upward beyond the collar, and having the traces fastened to them.

HAMESUCKEN, or HAIMSUCKEN, n. *hām'sŭk-n* [mid. L. *hamsocam*, forcible entry into a house: Icel. *heimr;* Scot. *hame*, home, and Goth. *sokjan;* Ger. *suchen*, to seek: Icel. *heimsókn*, an assault in one's home: Goth. *hemsokn;* Ger. *heimsuchen*, to visit, to invade violently]: in *Scots law*, the crime of assaulting a person within his own house.

HAMI, *hâ-mē'*, or KAMIL, *kâ-mēl'*, or KOMUL, *ko-môl'*, or KAMIL, *kâ-môl':* important town in central Asia, on the s. slope of the Tian-Shan Mts., on the n. border of the Great Gobi desert: lat. 42° 48′ n., and long. 93° 28′ e. Its height above sea-level is 3,150 ft. At the beginning of the 17th c., it was under the sway of the king of Kashgar, was under Chinese rule 1720; and has since been in their possession except during a few years of rebellion. The region is exceedingly fertile; and the location is on what will probably become the great island route of traffic between China and Europe.

HAMILCAR BARCA, *ha-mĭl'kâr bâr'ka:* most distinguished of Carthaginian generals and statesmen, next to his son Hannibal: d. B.C. 228. His surname Barca is the same as Heb Barak, i.e., 'lightning.' While very young he was appointed to the command of the Carthaginian forces in Sicily, B.C. 247, at which time the Romans had possession of almost all the island. Hamilcar's first care was to discipline his infantry thoroughly; he then established himself on Mount Ercte (now *Pellegrino*, near Palermo), and from this point made pillaging excursions in all directions, sending his privateers along the coast of Italy as far n. as Cumæ, thus obtaining abundant supplies for his troops. From this position the Romans endeavored to dislodge him, but in vain. After three years he left Ercte, and established himself on Mount Eryx, keeping up his communication with Drepanum and the sea, where the same tactics were repeated on both sides, and with the same want of success on the part of the Romans. But the Carthaginian admiral having been totally defeated off the Aegates Islands, B.C. 241, Hamilcar was compelled to abandon his fortress, and evacuate Sicily. While Hamilcar was engaged in Sicily, he had made large promises to his mercenary troops, which he was unable to perform; they revolted in consequence, and were joined by some of the African tribes. Hanno endeavored to suppress the revolt, but failed; Hamilcar was accordingly appointed to the command, and utterly defeated the rebels, capturing all their towns, and putting to death their leaders. Hamilcar was next appointed commander-in-chief of the Carthaginian army, and was engaged for some time in wars with the neighboring tribes, which were abruptly ended by Hamilcar's entering upon his Spanish campaign in (probably) B.C. 236. His great aim was to found a new empire in Spain, from which as his basis, he might assail the Romans. Thus he aimed to increase the power and wealth of his native country, and to atone to her for the

loss of Sicily and Sardinia. This his great purpose Hasdrubal and Hannibal, endeavored to accomplish. He marched westward, while the fleet under his son-in-law, Hasdrubal, cruised along the coast; he then crossed over at the Strait of Gibraltar, and made war on the natives of Spain, penetrating to the very heart of the country, subduing many tribes and cities, and seizing immense wealth. He spent nine years in Spain, and at length, B.C. 228, met his death on the field of battle while fighting against the Vetonnes. His military genius is considered scarcely inferior to that of his son Hannibal.

Hamilcar was the name of several other distinguished Carthaginians, the most celebrated of whom were—1. The commander of the great Sicilian expedition, B.C. 480: 2. One of the commanders of a Carthaginian army, defeated by Timoleon, the Corinthian general, at the Crimissus, B.C. 339; 3 (surnamed Rhodanus), ambassador to Alexander the Great after the fall of Tyre: 4. the governor of Sicily, B.C. 317: 5. the son of Gisco: who succeeded the preceding, and carried on military operations against the Syracusans and other states with great success, but was at length taken prisoner and put to death: 6. A commander during the first Punic War, very successful against the Romans by land in Sicily, but afterward defeated in a sea-fight off Ecnomus, and thereafter recalled to Africa to oppose Regulus.

HAMILTON, *hăm'ĕl-ton:* city of Victoria, Australia, capital of Dundas and Normanby, cos., situated in the w. part of the state, on Grange Burn creek, 48 m. n.e. of Portland, and 200 m., by rail, w. of Melbourne. It is the trading and export centre of an extensive farming, grazing, and stock-raising region, and is noted for its agricultural exhibitions and important race meetings. Pop. 5,000.

HAMILTON: town and commercial seaport, capital of the Bermuda Islands, or Great Bermuda, Long, or Hamilton Island. It was founded in 1790, and has a fine land-locked harbor, facilitating the export of fruits and other insular products, and is the chief port of call for pleasure and tourist steamers. Pop. 2,500.

HAMILTON: city of Canada, province of Ontario, port of entry and seat of Wentworth co. on Burlington Bay at the s.w. end of Lake Ontario, 38 m. s.w. of Toronto, and 45 m. n.w. of Niagara Falls, from which it receives electric lighting and power. Hamilton is an important centre for the Grand Trunk, the Canadian Pacific, N. Y. Central, Lehigh Valley, Wabash, Michigan Central and other railways, and as the port of an extensive grain and fruit-producing region, has considerable shipping and manufacturing interests and an active trade with the lake ports of the U. S. and Canada. It has a fine land-locked harbor reached through the Burlington canal cut across a sandbar known as Burlington Beach, the popular summer bathing resort of Hamilton. Hamilton has also a complete electric railway system. There are 19 miles of street

railway, 110 miles of streets, 60 miles of sewers, and 465 street electric lights. Hamilton is the chief manufacturing city in Canada and is in the centre of a fine fruit growing district. It manufactures very largely, some of the chief industries being agricultural implements, air brakes, and electrical supplies, belting, boots and shoes, carriages, cigars, tobacco, clothing, drugs, elevators, emery wheels, engine packing, fertilizers, files, fireworks, furnaces, gasoline engines, harness, glue, mats, paints, pottery, soaps, spices, silverware, nails, wine, vinegar, mattresses, wringers, washing machines, and musical instruments. It has 2 cathedrals, 62 Protestant churches, 7 Roman Catholic churches, 15 banks, 18 public schools, 7 separate schools, art schools, convents, a public library, 26 charitable institutions, 4 hospitals, a large insane asylum, parks, a wireless telegraph station and about 100 hotels. Pop. (1907) 60,000.

HAMILTON: village in Madison co., N. Y., on the Chenango canal, and on the New York, Ontario and Western Railroad; 29 m. s.s.w. of Utica, 37 m. s.e. of Syracuse. It is noted for its educational institutions, which include Colgate Univ., with the Hamilton Theological Seminary (Bapt.), Colgate Academy, etc. Hamilton has lumber yards, foundry, carriage and wagon works, canning factory, and since 1895 owns and operates its water-works and electric-lighting plant. The village also maintains a free public library and handsome park. Hamilton, named in honor of Alexander Hamilton, was first settled in 1792 and incorporated 1816. Pop. (1905) (1910) 1,689.

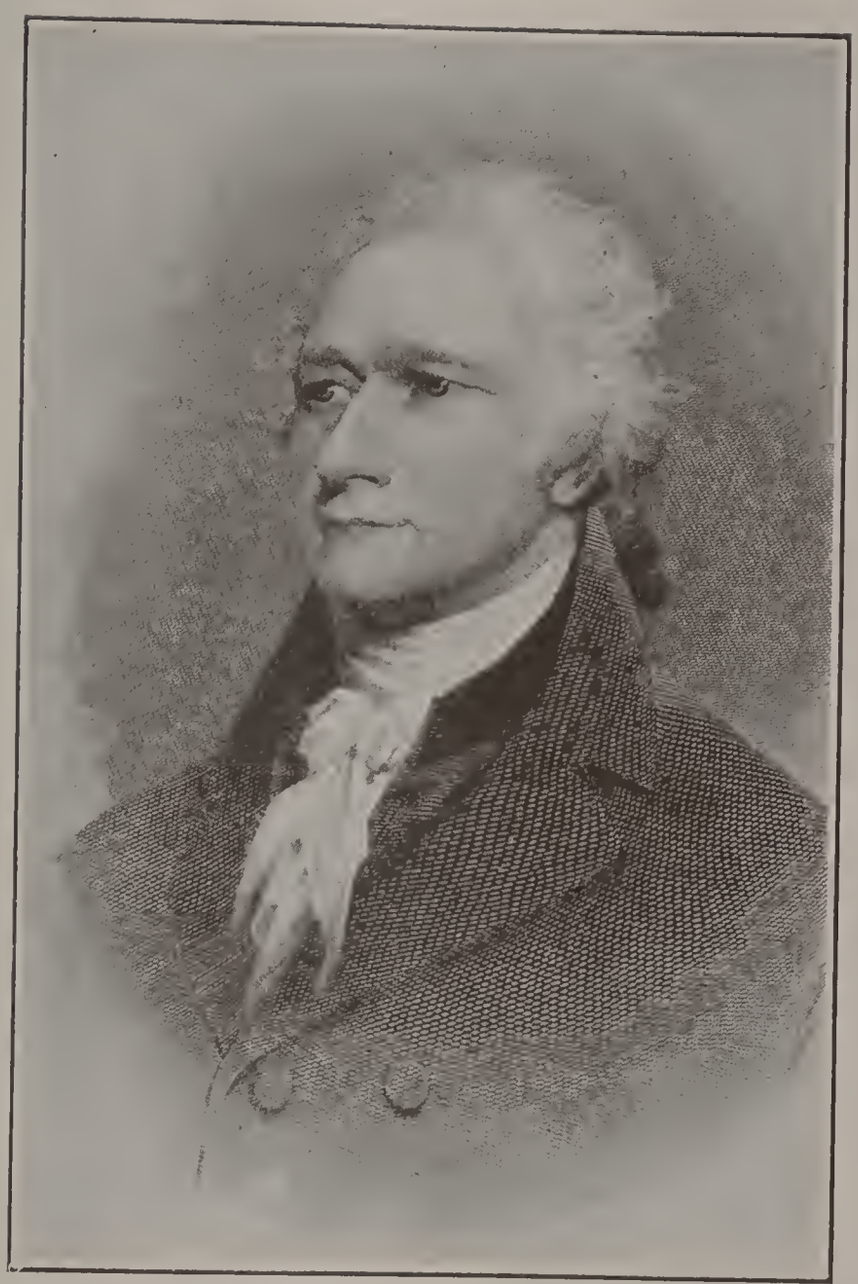
HAM'ILTON: city and county-seat of Butler co., Ohio; on both banks of the Great Miami river, and on the Miami and Erie canal, the Cincinnati, H. and Dayton, the Pittsburg, Cincinnati, Chicago and St. Louis, and other railroads, 15 m. n. of Cincinnati, 35 m. s.w. of Dayton. It is a large manufacturing centre in a rich and populous district, has unlimited water-power from river and canal, includes among its industries manufactures of railroad supplies, punches, reapers, mowers, engines, threshers, wood-working machinery, carriages and wagons, boots and shoes, saws, rope, pumps, brooms, candles, boilers, and sash and blinds, beside paper, woolen, and flour mills, breweries, distilleries, etc. It contains a courthouse, churches, national banks, public library, high, grammar, and primary schools, board of trade, parks, and owns and operates its water-works, gas and electric-lighting plants. Fort Hamilton, named in honor of Alexander Hamilton, was established here in 1791 by Gen. Arthur Saint Clair, and around it grew a village which was incorporated in 1810. Hamilton received a municipal charter 1853, when the village of Rossville was incorporated with it. Pop. (1910) 35,279.

HAM'ILTON, Alexander: 1757, Jan. 11—1804, July 12; b. Nevis Island, W. Indies: American statesman. His father was a Scotch emigrant, and his mother was of a Huguenot family. His early education was conducted by

HAMILTON, CANADA.

the Rev. Dr. Hugh Knox, Presb. clergyman of Nevis, and when 13 years old he was placed in a counting-house in Santa Cruz. While so employed he contributed to the local press; and these writings, as well as the force and directness of his business letters, attracted the attention of a number of gentlemen, including Dr. Knox, who provided him with the means to remove to the United States and take a full educational course. He arrived in Boston 1772, Oct., was prepared for college at Elizabethtown, N. J., entered King's (now Columbia) College 1773, and withdrew to give his support with pen and voice to the colonial cause 1774. During the next two years, he won wide repute by his vigorous speeches, and his no less stirring pamphlet and newspaper writings; and when his authorship of *A Full Vindication* and *The Farmer Refuted* —which had been attributed to John Jay and other experienced leaders—was established, the youth of 18 became a power in the patriot movement. In 1776, he was appointed by the New York convention commander of a company of artillery, and showed such high executive qualities, especially at the battles of Long Island and White Plains, that he was commended by Gen. Greene and invited by Washington to become his aide-de-camp with the rank of lieutenant-colonel 1777. He became Washington's chief secretary and confidential executive, and maintained this relation till 1781, Feb. 16, when he resigned from the staff in consequence of the commander's criticism on one of his acts. During the interval he performed many services requiring keen judgment and diplomatic skill, and, after resigning from the staff, retained his army commission, led a corps of light infantry under Lafayette at Yorktown, and greatly distinguished himself by capturing a British redoubt at the head of a picked storming party. On retiring from the army, he began to study finances, the science of government, and law; continued his political letters; urged and planned the establishment of a national banking system; was admitted to the bar; and became continental receiver of taxes for New York. In 1782, he entered congress, but was unable to accomplish any of the reforms that he had at heart, and, after a year's service, retired and resumed the practice of law. He had become convinced that the federative system had outgrown its usefulness, and that a stronger and more centralized form of govt. was needed. He elaborated a scheme of govt. based on his views of the necessities of the period, but found no practical support or indeed encouragement till Virginia proposed the Annapolis convention to formulate commercial relations that would be common to all the states 1786. He attended the convention, drew up the address expressive of the views of the delegates and calling a new convention to meet in Philadelphia 1787, May 2; and then exerted all his energy to secure a proper representation from his own state. He was elected a member of the legislature, fought a strong opposition to the convention, was appointed a delegate

with two associates from the opposition, and in the convention presented his govt. scheme and supported it in a 5-hours' speech. Realizing that his plan could not be adopted, and seeing that his colleagues opposed him at every step, he withdrew from the convention till its closing hours, when he joined in the debates and signed the proposed constitution. Then, stirred to vigorous action by the growing opposition of the Clinton party, he established *The Federalist* (q.v.), wrote 54 of its 85 memorable essays designed to secure the adhesion of N. Y. state to the new constitution, and in the state ratifying convention by an eloquent and skilful argument, changed an adverse vote of two to one to a triumphant majority. On the inauguration of President Washington and the organization of the treas.dept., Hamilton was placed at the head of that important dept. by the personal choice of the pres. as well as the earnest recommendation of Robert Morris, who had been familiar with his views on the national finances since 1781. The wisdom of Washington's selection soon became evident, and a century has added imperishable lustre to Hamilton's grand financial achievements 1789–95. To summarize the work of those 5 years. He brought order out of the confusion of national and state finances; provided a funding system and elaborated a plan of taxation to sustain it; reported a scheme for the assumption by the federal govt. of the state debts; and submitted special reports, by direction of the pres. or congress on the means of raising and collecting revenue, establishment of a revenue-cutter service, provision of navigation-laws, purchase of West Point for a milit. acad., management of the public lands, creation of a national mint, establishment of a national bank, excise, improved taxation, and extinction of the national debt. During this period he applied his whole energies to the financial interest of the country, and in so doing impoverished himself to an extent that led him to resign 1795 and resume his profession. As secretary of the treasury he naturally was confronted with opposition, but for this he seemed to care little till some of his political enemies attacked his official integrity, when he promptly prepared and published a series of reports giving the fullest details of every public loan and the entire operations of his dept. from its organization. He worked laboriously early and late at his profession, and was credited by Talleyrand with being 'one of the wonders of the world. I have seen a man laboring all night to support his family, who had made the fortune of a nation.' Strong as were his private necessities, his interest in public affairs never flagged and his advice and co-operation were frequently sought by Washington and others. It is now known that he materially aided Washington in preparing his noted farewell address. After retiring from the treas. dept., he was offered and declined the office of chief-justice of the U. S. supreme court. He supported Adams and Pinckney in the presidential canvass 1796, though he had previously incurred the hostility of Adams, and was then considered



ALEXANDER HAMILTON.

to be more favorably inclined to the latter. In 1798, when there was prospect of war between France and the United States, it was deemed necessary to reorganize the army. The chief command was conferred on Washington, who accepted it only on the conditions that he should not be called into the field except in case of actual hostilities and that Hamilton should be second in command. Adams resisted this appointment till Washington threatened to resign the command, and Hamilton then became inspector-general with the rank of maj.gen. On the death of Washington, Hamilton succeeded him as commander-in-chief, and when he had brought the army into thorough organization and discipline the emergency had passed, and he resumed his law practice. In 1800 he was elected president-general of the order of the Cincinnati, and after the defeat of the federalist party in the presidential election the same year, he advised his friends to support Jefferson rather than Burr when the duty devolved on the house of representatives of deciding which of the two should be pres. He succeeded in accomplishing the defeat of Burr; and from that moment a hostility existed between Hamilton and Burr that neither cared to conceal. Hamilton again returned to his professional work, and did not take an active part in political matters till 1804, when he successfully opposed Burr's candidacy for gov. of N. Y. Burr's defeat exasperated him to challenge Hamilton to a duel for language used in the canvass; and though Hamilton was sturdily opposed to the duelling code, he felt constrained by political reasons to accept. The principals with their seconds met at Weehawken, N. J., 1804, July 11. Hamilton declined to fire at Burr and fell mortally wounded by his adversary's first shot, and died the next day: see BURR, AARON.

HAM'ILTON, ALLAN MCLANE, M.D.: b. Brooklyn, N. Y., 1848, Oct. 6: great-grandson of Gen. PHILIP SCHUYLER and grandson of ALEXANDER HAMILTON. He graduated at the College of Physicians and Surgeons, New York, 1870; became a health-inspector 1873; was an expert witness in the Guiteau trial and the Jesse Hoyt and Cadet Whittaker cases; has been physician in charge of the N. Y. State Hospital for Diseases of the Nervous System, and visiting physician to the Epileptic and Paralytic Hospital, on Blackwell's Island, N. Y.; has published several works on nervous diseases including *Clinical Electro-Therapeutics* (1873); *Nervous Diseases* (1878); *Medical Jurisprudence* (1883); *A System of Legal Medicine* (1894); *Railway and Other Accidents* (1904); etc.

HAM'ILTON, ANDREW; governor of E. and W. Jersey; b. Scotland; d. Burlington, N. J., 1703, Apr. 20. He was brought up to a mercantile career in Edinburgh; became one of the proprietors of E. Jersey, deputy gov. 1686 and acting gov. 1687; was captured by the French at sea while on his way to London 1689; appointed gov. of E. Jersey with charge of W. Jersey 1692, Mar., and served till 1698; returned to London and was again appointed

gov. 1699; served two years and then became deputy gov- of Penn.; and died while holding that office. He organized the first postal service in America, under a crown patent 1694.

HAM'ILTON, ANTHONY, or ANTOINE: 1646–1720, Aug. 6; b. Ireland; descended from the Scottish ducal family of Hamilton. After the execution of Charles I., he, with his parents, followed the royal family to France. On the accession of Charles II. 1660, he returned to England, but was excluded from office as being a Rom. Catholic. James II. gave him a regiment of infantry in Ireland, and made him gov. of Limerick; but after the abdication of that monarch, Hamilton returned to France, where he passed the rest of his life, and died at St. Germain-en-Laye. His writings are full of wit and talent, particularly *Contes de Féerie* (3 vols. Paris 1805). His *Mémoires de Grammont* is lively and spirited, exhibiting a free and faithful delineation of the court of Charles II. It has been often translated into English. The last edition is that in Bohn's Series, with Scott's notes and illustrations. One of the best editions of his collective works was published by Renouard (3 vols. Paris 1812).

HAM'ILTON, CHARLES SMITH: manufacturer: b. New York, 1822, Nov. 16; d. 1891, Apr. 17; son of JOHN CHURCH HAMILTON. He graduated at the U. S. Milit. Acad. 1843; served through the Mexican war, was brevetted capt. for gallantry at Contreras and Churubusco and wounded at Molino del Rey; resigned and engaged in farming 1853; became col. of the 3d Wis. vols. and brig.gen. of vols. 1861, May, and maj. gen. of vols. 1862, Sep.; commanded a div. at Corinth, the left wing of the army of the Tenn., and the 16th corps; resigned 1863, Apr., and engaged in manufacturing in Fond du Lac, Wis. He was pres. of the board of regents of the Univ. of Wis. 1866–75, and U. S. marshal for the dist. of Wis. 1869–77.

HAMILTON, EDWARD JOHN, American educator: b. Belfast, Ireland, 1834, Nov. 29. He was graduated at Hanover College, Indiana, in 1853, and at Princeton Theological Seminary in 1858; was professor of mental philosophy at Hanover College in 1868–79, and of philosophy at Hamilton College, Clinton, N. Y., in 1883–91. From 1895–1900 he was professor of philosophy in the State University of Washington. He is the author of what is known as *Perceptionism* (a system of metaphysical philosophy), and has published *A New Analysis of Fundamental Morals* (1870); *The Human Mind* (1883); *The Modalist* (1883); *The Perceptionalist or Mental Science* (1899); *The Moral Law, or The Theory and Practice of Duty* (1902); etc.

HAM'ILTON, EMMA LYON, Lady: 1764, Apr. 26—1815, Jan. 16; b. Preston, Lancashire, England; second wife of Sir William Hamilton. She was the illegitimate child of a servant girl; was employed as child's nurse when 13 years old; removed to London and became a sales clerk when 16;

entered the service of a lady of rank; engaged as waiter in a tavern; was mistress for several years of a sea capt., who gave her to a friend, by whom she was deserted in a month; represented *Hygica* in a quack doctor's show; captivated Charles Greville and bore him 3 children and, when he was forbidden to marry her by his uncle, Sir William Hamilton, the nephew transferred her to the uncle in return for the payment of his debts. Sir William married her, introduced her at court, and permitted her to become the mistress of Lord Nelson, by whom she had a daughter Horatia Nelson. She was a beautiful and intriguing woman; brought about a war between England and Spain; and ended her disgraceful career in France, where she died destitute.

HAM'ILTON, Frank Hastings, M.D., LL.D.: 1814, Sep. 10—1886, Aug. 11: b. Wilmington, Vt.: surgeon. He graduated at Union College 1830 and the medical dept. of the Univ. of Penn. 1835; was appointed prof. of surgery in Western College of Physicians and Surgeons 1839, in the Geneva Medical College 1840, and in the Buffalo Medical College—of which he became dean—1846; became surgeon to the Buffalo Charity Hosp., prof. of the principles and practice of surgery and surgeon-in-chief of the Long Island College Hosp. 1859, and prof. of milit. surgery there 1861; had charge of the general field hospital during the first Bull Run battle; was appointed brigade surgeon and medical director 1861; organized the U. S. general hospital in Central Park, New York, 1862; was medical inspector U. S. A. 1863; and in the latter year resigned and resumed duty as prof. of milit. surgery in Bellevue Hosp. Med. College. He was consulting surgeon to several hospitals and city dispensaries till his death, and was consulting surgeon to the staff that attended President Garfield. He was a member of many medical and surgical societies, inventor of numerous surgical instruments, and author of a large number of books, pamphlets, and reports on surgical topics. He wrote on the principles and practice of surgery three works regarded as standard on the subjects treated: *Treatise on Fractures and Dislocations* (1860); *Practical Treatise on Military Surgery* (1861); and *The Principles and Practice of Surgery* (1872).

HAM'ILTON, George Francis, Lord: third son of the Duke of Abercorn; b. Brighton, England, 1845, Dec. He was educated at Harrow, elected member of parliament in Middlesex co. as a conservative 1868, again defeated the liberal candidate 1874; was appointed by Disraeli parliamentary under-sec. of state for India 1874; became vice-pres. of the committee of council on education 1878; was first lord of the admiralty in Lord Salisbury's cabinet 1885, June—1886, Feb., and again from 1886–92; and from 1895–1903 was secretary of state for India.

HAMILTON, James, American statesman: b. Charleston, S. C., 1786, May 8; d. at sea 1857, Nov. 15. He was educated for the bar, but entered the army and served with credit as a major in the Canadian campaign of 1812.

At the end of the war he resumed the practice of law in Charleston. For several successive years Hamilton was chosen mayor, or, as it was then termed, intendant of Charleston. To his vigilance and activity was chiefly due the detection of a formidable conspiracy in 1822 among the negro population, led by Denmark Vesey, a free mulatto from Haiti. In the same year he was elected to the State legislature, and was also chosen a representative in Congress, of which he soon became a prominent and popular member. He became noted for intense and energetic opposition to the protective system and favored direct taxation, regarding all indirect processes for raising revenue as frauds upon the people, and as disparaging to the popular intellect, as well as popular morals. He quitted Congress to become governor of South Carolina in 1830, at a period when the State had resolved upon nullifying the tariff laws of the federal government. On the settlement of this question by Clay's compromise, Hamilton retired from public life for a time. Later he became interested in the cause of Texas, to which he devoted his personal services, and a large portion of his private fortune. In 1841, while Texas was an independent republic, he was her minister to England and France, where he procured the recognition of her independence. On the death of Calhoun in 1852, he was appointed his successor in the United States Senate, but declined the office.

HAMILTON, John Church, American biographer and historian, son of Alexander Hamilton (q.v.): b. Philadelphia 1792; d. 1882. Besides editing his father's works (1851), he wrote: *Memoirs and Life of Alexander Hamilton* (1834–40); *History of the Republic* (4th ed. 1879); *The Prairie Province* (1876), sketches of travel.

HAMILTON, John Taylor, American Moravian clergyman: b. Antigua, W. I., 1859, April 30. He was graduated from the Moravian College, Bethlehem, Pa., in 1875, and from the Moravian Theological Seminary there in 1877. He was pastor of the Second Moravian Church in Philadelphia, 1881–6, and has been a resident professor at the Moravian College and Seminary from the latter date. Since 1905 he has been missionary bishop of the Moravian church. He has published *History of the Moravian Church in the United States* (1895); *History of the Moravian Church During the 18th and 19th Centuries* (1900); *History of Moravian Missions* (1900).

HAMILTON, John William: an American clergyman; b. in Weston, Va., 1845, Mar. 18; was graduated at Mt. Union College, O., 1865; and Boston University, 1871; admitted to the Pittsburg Conference of the Methodist Episcopal Church in 1868; transferred to the New England Conference in the same year; was founder and for nine years pastor of the People's Church, Boston; fraternal delegate to churches in Ireland and England in 1898; corresponding secretary of the Freedmen's Aid and Southern Education Society, 1892–1900; and became bishop of the Methodist Episcopal church 1900, May. He

was the author of *Memorial of Jesse Lee and the Old Elm; Lives of the Methodist Bishops; People's Church Pulpit; American Fraternal Greetings*, etc., and editor of *The Christian Educator*.

HAMILTON, Kate Waterman, American novelist: b. Schenectady, N. Y., 1841, Nov. 12. Since 1870 she has lived in Bloomington, Ill. She is the author of *We Three; Vagabond and Victor* (1879); *Rachel's Share of the Road* (1882); *Tangles and Corners* (1882); *The King's Seal* (1887); *The Parson's Proxy* (1896); *The Kinkaid Venture* (1900); *How Donald Kept Faith* (1900); etc.

HAM'ILTON, Patrick: one of the most prominent precursors of the Scottish Reformation: 1504–1528, Feb. 29; b. prob. Glasgow; younger son of Sir Patrick Hamilton of Kincavel and Stanehouse, and Catherine Stewart, daughter of Alexander, Duke of Albany, second son of King James II. He was educated at the Univ. of Paris, where he took his degree 1520, after which he proceeded to Louvain, and thence removed to Basel 1521.

Hamilton settled in St. Andrews 1523, quietly pursued his theological studies, and did not as yet venture to put himself forward as a reformer. But gradually his convictions matured. From agreeing with Erasmus, he came to agree with Luther; and about 1526, he appears to have announced his new views in such a manner as to draw the notice of Abp. Beaton. Early in 1527, Beaton made 'inquisition' into the grounds of the rumor against him, and found that he was 'infamed with being disputing, holding, and maintaining diverse heresies of Martin Luther and his followers, repugnant to the faith,' and thereupon proceeded to 'desire' him to be formally summoned and put to trial. In the following year, he carried out his summons by a professed trial and conviction, declaring him worthy of death. In the mean time, Hamilton had fled to Germany, where he became familiar with Luther and Melancthon. The Protestant education of Hamilton was in this manner very complete.

After a residence of six months, Hamilton returned to his native country. He repaired to the family mansion at Kincavel, and there, in the neighborhood of Linlithgow, openly preached the gospel. What is more remarkable, he is supposed, during this brief period of quiet and retirement at Kincavel, to have married. It is somewhat strange that, following such an event, he should have been induced to quit his retirement, where he was in comparative safety, and proceed to St. Andrews. Beaton, however, contrived to allure him within his grasp. He 'travailed with the said Mr. Patrick,' Knox says, 'that he got him to St. Andrews.' Hopes seem to have been held out of some good being effected by a conference with him as to the state of the church, and its need of reformation; for 'reformation' of some kind was a common talk at this time in the church, and many plans for it were considered, and some attempted. Hamilton arrived at St. Andrews 1528, Jan., and took up his abode in a lodging

provided for him by the archbishop. A conference was held, in which his opponents showed a conciliatory spirit, and even to some extent expressed concurrence in his views. No advantage appears to have been taken of his former summons and condemnation. He was allowed openly, for some time, to promulgate his sentiments in the city and university. With all visitors he freely conversed, and, among them, with Alexander Alane or Alesius, at this time one of the canons in the priory, and with Alexander Campbell, one of the Dominican friars, 'a young man of good wit and learning,' suborned, it is alleged, by Beaton, to entrap him into avowals of heretical opinion. After a month or so (*plus minus mensem*, says Alexius), he was summoned to answer before Beaton to a charge of heresy. The trial took place Feb. 29; and the result, in spite of his luminous and unanswerable argument, was that he was condemned for diverse heresies and 'detestable opinions,' deprived of all dignities and benefices in the church, and delivered over to the secular power to be punished. The sentence was executed without delay. The warrant of the secular power must have been already secured, for on the very same day on the morning of which he was tried, Hamilton was consigned to the stake in front of the gate of St. Salvador's College. He died as he had lived—a humble, heroic man. His death probably did more to extend the Reformation in Scotland than even his life could have done. The 'reik of Mr. Patrick Hamilton,' said one of Beaton's own retainers, 'has infected as many as it did blow upon.'

HAM'ILTON, Schuyler: soldier: b. New York, 1822, July 25; d. there 1903, Mar. 18. He was a grandson of Alexander Hamilton and great-grandson of Gen. Philip Schuyler. He graduated at the U. S. Milit. Acad. 1841, became assistant instructor of tactics there; served through the Mexican war, and was brevetted for gallantry at Monterey and Mil Flores; was aide-de-camp to Gen. Scott 1847–54, held staff appointments under Gens. Butler, Scott, and Halleck early in the civil war; was commissioned brig.gen. of vols. 1861, Nov. 12, and promoted maj.gen. 1862, Sep. 17; commanded the dept. of St. Louis, a div. at Island No. 10, and New Madrid, and the reserves at the battle of Farmington; and resigned, from ill-health, 1863, Feb. 27. He was hydrographic engineer for the dept. of docks, New York, 1871–75. He published *History of the National Flag of the United States* (1852).

HAM'ILTON, Sir William: grandson of William, third Duke of Hamilton: 1730–1803, Apr. 6; b. Scotland; of a noble stock, but impoverished family. He was, 1764, appointed English ambassador to the court of Naples, and there he was active in the excavation of the ruins of Herculaneum and Pompeii, collecting a rare assortment of art-relics, chiefly Greek and Etruscan antiquities, afterward purchased for the British Museum. He was recalled to England 1800; but on his way home his vessel was wrecked, and a great part of his collection of

antiques lost. Drawings of these had, however, been preserved, which were published in his *Antiquités Etrusques, Grecques, et Romaines tirées du Cabinet de M Hamilton* (4 vols. Naples 1766). He published also *Observations on Mount Vesuvius, Mount Etna,* etc. (Lond. 1772); *Campi Phlegraei* (Naples 1776–7), etc.; besides papers in *Philosophical Transactions* (Lond. 1767–95). Hamilton's claim on the British govt. for special services was disallowed, and he died at London in comparative poverty.—The wife of Hamilton was the notorious Lady Hamilton (Emma Lyon Hamilton), whose name figures unpleasantly in the biography of Lord Nelson

HAM'ILTON, Sir William, of Preston, Bart.: the most learned and scientific philosopher of the Scottish school: 1788, Mar. 8—1856, May 6; b. Glasgow, where his father, Dr. William Hamilton, and his grandfather, Dr. Thomas Hamilton, held in succession the chairs of anatomy and botany. Though the Hamiltons of Preston (Haddingtonshire), who were raised to a baronetcy 1673, had not assumed their title since the death of Sir William Hamilton, 1688, Nov., when his brother and heir, Sir Robert Hamilton, the Covenanter, refused to take the oath of allegiance, the philosopher made good his claim to represent them, and therefore, to be descended from the leader of the Covenanters at Drumclog and Bothwell Bridge. After gaining high distinction, especially in the philosophical classes at Glasgow, he went 1809, to Balliol College, Oxford, as a Snell exhibitioner, and there took a position which never had and never has been surpassed, laying the basis of his vast erudition in mediæval and modern, as well as in ancient literature (see *Discussions*, 2d. ed. 750 *note*). He left Oxford 1812, and entered the Scotch bar 1813, but seems not to have practiced in his profession. On the death of Dr. Thomas Brown, 1820, he was an unsuccessful competitor for the chair of moral philosophy in Edinburgh. In the following year, however, Hamilton was appointed to the professorship of history.

Hamilton had now reached his 30th year, without giving to the world any indication of those speculations which he had been silently and slowly maturing. But there appeared in the *Edinburgh Review,* 1829, a critique of Cousin's *Cours de Philosophie* of the previous year, in which was developed that philosopher's doctrine of the Infinite. The critique immediately excited admiration, especially on the continent, Cousin himself acknowledging that his reviewer understood thoroughly the theory which he opposed, and combated it with a speculative power, with a knowledge of philosophical systems, and a command of philosophical expression, which he had not expected in Britain. For some years after this Hamilton was a regular contributor to the *Edinburgh Review.* Besides other philosophical articles—two of which, on the Philosophy of Perception, and on Recent Publications in Logical Science, are especially notable—he contributed several on education and university reform. Many of these, besides being

republished in Mr. Crosse's *Selections from the Edinburgh Review*, were translated into German, French, and Italian, the French collection, *Fragments de Philosophie*, being valuable for the introduction, appendix, and notes of its editor, Peisse. In 1852, they all were edited by Hamilton himself, with large notes and appendices, under the title of *Discussions in Philosophy and Literature, Education, and University Reform*. In 1836, after a severe contest, Hamilton was elected to the chair of logic and metaphysics in Edinburgh. During his first session, he delivered a course of lectures on metaphysics, which was followed in the succeeding session by a course on logic; and these two courses he continued to read on each alternate year till the close of his life. His influence soon began to show itself in the university, to which he attracted many young men. Extensive notes of his lectures were taken by his students, and numerous copies of them, transcribed from short-hand reports, were in circulation during the later years of his life. Since his death, they have been published under the editorship of Professors Mansel and Veitch (*Sir William Hamilton's Lectures*, 4 vols. 1859–61; 6th ed. 1877). These lectures, written mostly during the sessions in which they were first delivered, lack the exactness of thought and expression which render the works revised by himself for publication models of philosophical composition; yet this may give them a higher value as introductory works. Still it is to be regretted that the materials embodied in these volumes were never, as was intended, wrought into another work which Hamilton had already planned at the time of his appointment. This was his edition of the works of Reid, with notes and supplementary dissertations. It is perhaps impossible to adduce any writings which have received the same amount of editorial care. The general aim of Hamilton's whole philosophy is, in fact, but the special aim of this edition of Reid. His conviction was, that the philosophy of common sense (see COMMON SENSE, THE PHILOSOPHY OF) represents the highest reaches of human speculation, and he sought, accordingly, in his annotations of Reid's writings, as in his independent works, to point out the relation of the Scottish philosophy to the systems of other countries, as well as to translate it into a more scientific expression, that he might bring into clearer view its true character and real basis. In this therefore, more than in any of his other works, he betrays his fondness for eliciting his own theories from the hints of previous thinkers; his peculiar doctrines of perception, of the conditioned, of mental reproduction, etc., are traced to the writings of Aristotle. Valuable, however, as this work is, its latest edition contains references to numerous dissertations beyond that, in the middle of which it abruptly stops. This is undoubtedly to be attributed to the decay of Hamilton's health. By the paralysis of his whole right side, though his mind continued unimpaired, his power of work was seriously curtailed during his later years. He was, how-

ever, generally able, with an assistant, to perform the duties of his class till the close of session 1855–6, when he suddenly began to fail, and death came on. A *Memoir of Sir William Hamilton* was published by Prof. Veitch 1869. A short sketch of his life and estimate of his place in the history of philosophy, by W. S. Monck, appeared 1881.

Hamilton's system professes to be merely an explication of the Scottish philosophy; it may, however, be questioned whether all his exegetical skill has vindicated the position claimed for Reid, whether, therefore, it would not have been better for Hamilton had he made a separate path, through which he might have reached a philosophic system less hampered, and more fitted to be universal. For while his philosophy is distinguished in general from previous Scottish speculations by its more rigorously systematic character, it ventures, as in his doctrine of the conditioned, into realms of thought, whose existence had been scarcely surmised by any of his countrymen. This doctrine, which limits positive thought to the conditioned sphere between the contradictory poles of the infinite and the absolute, has attracted more attention than any of his other doctrines, especially since the publication of Mr. Mansel's *Bampton Lectures* 1858; and though Hamilton's discussion is confined to the metaphysical aspects of the question, and is perhaps incompatible with a consideration of the ethical ideas which must be embraced in our conception of the Infinite Being, it continued for a time to gather round it the higher efforts of British speculation. (See CONDITIONED, THE PHILOSOPHY OF THE.) Hamilton is distinguished also by important contributions to logic. These may be reduced to the two principles (1) of distinguishing reasoning in the quantity of extension from reasoning in that of comprehension, and (2) of stating explicitly what is thought implicitly; from the former of which issues his twofold determination of major, minor, and middle terms, as of major and minor premises; from the latter the quantification of the predicate, the reduction of the modes of conversion to one, and his numerous simplifications in the laws of syllogism. Hamilton reveals in his writings his singular intensity and moral force. He had great polemical ardor, yet an equal sincerity and candor.

HAMILTON, SIR WILLIAM ROWAN, LL.D.: one of the few really great mathematicians of the 19th century: 1805, Aug. 4—1865, Sep. 2; b. Dublin. His father had migrated in youth from Scotland. From infancy he showed extraordinary talents, and at the age of 13 had a good knowledge of 13 languages. In his 15th year he had mastered thoroughly all the ordinary university course in mathematics, and commenced original investigations of so promising a kind, that Dr. Brinkley took him under his especial patronage. His earlier essays, connected with contact of curves, and caustics, grew by degrees into an elaborate treatise on the *Theory of Systems of Rays*, published by the Royal Irish Acad. 1828. To this he added

various supplements, in the last of which, 1833, he predicted the existence of the two kinds of conical refraction (see REFRACTION), the experimental verification of which by Lloyd still forms one of the most convincing proofs of the truth of the Undulatory Theory of Light (see LIGHT). The great feature of his *Systems of Rays* is the employment of a single function, upon whose differential coefficients (taken on various hypotheses) the whole of any optical problem is made to depend. He seems to have been led by this to his next great work, *A General Method in Dynamics*, published in *Philosophical Transactions* 1834. Here, again, the whole of any dynamical problem is made to depend on a single function and its differential coefficients. This paper produced a profound sensation, especially among continental mathematicians. Jacobi of Königsberg took up the purely mathematical part of Hamilton's method, and considerably extended it. and of late years the dynamical part has been richly commented on and elaborated by several French mathematicians, all uniting in admiration of the genius shown in the original papers. For these researches, Hamilton was elected an honorary member of the Acad. of St. Petersburg, a rare and coveted distinction. The principle of *varying action* forms the main feature of the memoirs. Among Hamilton's numerous works, are a very general *Theorem in the Separation of Symbols in Finite Differences*, and *Examination of Abel's Argument concerning the Impossibility of solving the General Equation of the Fifth Degree*. Notable also is his memoir on *Algebra as the Science of Pure Time*, one of the first steps to his grand invention of quaternions. For the steps by which he was led to this latter investigation, which will certainly, when better known, give him even a greater reputation than conical refraction or varying action has done (see QUATERNIONS). On the latter subject he published, 1853, a large vol. of *Lectures*, which, as the unaided work of a single man in a few years, has perhaps hardly been surpassed. Another more elementary vol. on the same subject, adding his more recent improvements and extensions of his calculus, was published after his death.

While yet an undergraduate of Trinity College, Dublin, he was appointed, 1827, successor to Dr. Brinkley in the Andrews' chair of astronomy in the Univ. of Dublin, to which is attached the astronomer-royalship of Ireland. In 1835 he was knighted on his delivering the address as sec. to the British Assoc. for its Dublin meeting. He was for many years president of the Royal Irish Acad. and was a member of most of the great scientific academies of Europe. See his *Life* by Graves (1883).

HAMILTON COLLEGE: at Clinton, Oneida co., N. Y.; under the auspices of the Presb. Church; chartered and opened as a college 1812. It is the outgrowth of the Hamilton Oneida Acad., established through the efforts of the Rev. Samuel Kirkland, 1793. The collegiate course occupies four years. The buildings comprise a

chapel, three halls, library and memorial hall, the noted Litchfield observatory, gymnasium, boarding hall, Knox hall of natural history, and a chemical laboratory. The cabinets contain the herbarium collected by the late Dr. H. P. Sartwell, comprising 8,000 samples of plants, cured, labelled, and classified in 62 vols.; the collections in entomology, ornithology, and comparative anatomy, and three generations of 17-year locusts, presented by Judge Thomas Barlow; and more than 20,000 specimens in geology, mineralogy, and natural history. The observatory, long noted for the superior excellence of its service, was endowed, together with a chair of astronomy, with $30,000, by Edwin C. Litchfield 1867; and Dr. Christian H. F. Peters, who had been instructor in astronomy since 1858, was made prof. and director of the observatory, and held both offices till his death 1890, July 19. The observatory is equipped with an equatorial telescope having a focal length of nearly 16 ft. and an object-glass of 13.5 inches; a Steinheil portable telescope; a Bond chronograph; an astronomical clock; and a transit-instrument. The law school, founded 1854, contains the valuable law library of 5,000 vols. bequeathed it by William Curtis Noves. In the college year 1906–7 there were 20 professors and instructors; 181 students of all grades; 60 scholarships; 47,000 vols. in the libraries; grounds and buildings valued at $500,000; permanent productive funds $568,000; and income from all sources, excepting board and lodging $100,000.

HAMILTON SERIES, a series of rocks, including the Hamilton and Marcellus stages and constituting the middle Devonian. The name is from the town of Hamilton, 29 miles south of Utica, N. Y., where the series is typically developed. The Hamilton, like the other Devonian formations, was laid down along the Atlantic shores of what was then the American continent and in a great interior sea, sedimentation being heaviest in the northeast gulf of this sea. The sea extended from eastern New York to western Iowa. In the west the series is largely calcareous. The series is about 1,500 feet thick in eastern New York and reaches a maximum of 2,000 to 5,000 in Monroe County, Pa. It rapidly thins westward and the south end of Lake Huron is only 20 to 50 feet thick. At the falls of the Ohio, above Louisville, the series is represented by 20 feet of hydraulic limestone. The rocks forming the high cliffs along the Delaware River south of Port Jervis, Pa., are of Hamilton Age. Outside of the interior basin rocks of Hamilton Age have been determined in the Gaspe region of Canada, where they reach a thickness of 7,040 feet. In the Eureka district, Nevada, is a great but undetermined thickness of Hamilton limestone, and in the Mackenzie River valley in Northwest Territory is a deposit of fully 500 feet of fossiliferous limestone, partly at least of Hamilton Age. From the fossils found it is evident that the plants in the Middle Devonian forests were mostly Acrogens and included giant club mosses or Lycopods,

tree ferns and Equisetæ. One tree fern, *Psaronius*, had a trunk four feet thick. The gymnosperms were ancestors of the family of the conifers, being related to the yews. Insects, some of considerable size, abounded. In the ocean brachiopods were the most numerous and characteristic animals. Lamellibranchs were more abundant than in Cambrian time and there were true barnacles. The shallow muddy waters of the eastern part of the interior sea were not favorable to the growth of crinoids and corals, but these were common westward. Of the gasteropods *Platyceras* and *Pleurotomaria* were common genera. See DEVONIAN PERIOD; DEVONIAN SYSTEM.

HAMILTON STAGE, the upper division of the Hamilton series of rocks, consists chiefly of shaly sandstone and fine shales with a few thin seams of limestone. In Ulster, Albany, and Green counties, N. Y., the thick-bedded shales are known as North River flagstone, and are quarried on the Hudson River near Kingston, Saugerties, and Coxsackie. Some of the thicker layers of these flagstones are known as bluestone, and are used not only for flags and curbing but for architectural purposes.

HAMIRPUR, or HUMERPOOR, *hŭm-ēr-pôr′:* district in the N. W. Provinces, British India; lat. 25° 5′—26° 10′ n. long. 79° 22′ 45″—80° 25′ 15″ e.; bounded n. by the Jumna, n.w. by the state of Baoni and Betwa river, w. by the Dhasan river, s. by the states of Alipura, Chhatarpur, and Charkhari, e. by the Banda district; and comprising the states of Sarila, Jiqui, and Bihat, and portions of Charkhari and Garrauli. It contains a series of remarkable artificial lakes built about 800 years ago for irrigation, extensive ruins of beautifully carved and decorated granite temples. The soil is fertile, and there are several rivers of which the non-navigable ones of Betwa and Dhasan are chief. Cotton and grain are the principal products, and cotton cloth and soapstone ornaments the chief manufactures. It contains 6 towns of more than 5,000 inhabitants. It was the centre of the Chandel kingdom 9th—14th c., became a Mussulman possession at the close of the 13th c. and remained so 500 years, and was the scene of a fierce rebellion at the outbreak of the Indian mutiny. Capital, Hamirpur. Pop. dist. about 515,000.

HAMITE, n. *hā′mīt* [L. *hāmŭs*, a hook]: in *geol.*, a genus of the ammonite family, so named from the shell, which is hooked or bent upon itself.

HAMITES, n. plu. *hăm′īts:* the descendants of *Ham*, the son of Noah. HAMITIC, a. *hă-mĭt′ĭk*, pertaining to *Ham*, or to his descendants.

HAMLET, n. *hăm′lĕt* [AS. *ham*, a village, a town: Goth. *haims;* F. *hameau;* OF. *hamel*, a hamlet, a village: Swiss, *hain*, the inclosed ground in which a house is situated]: a little cluster of houses in the country; a small village.

HAM′LET, Prince of Denmark. See AMLETH.

HAM'LEY, Sir Edward Bruce, English general: b. Bodmin, Cornwall, 1824, Apr. 27; d. London, 1893, Aug. 12. Entering the army in 1843, he served through the Crimean war; was professor of military history at Sandhurst 1858–64, and commandant there 1870–77; and division commander in the Egyptian war of 1882. His *Operations of War* (1866) is a recognized text-book for military examinations. Among his other publications are: *The Story of the Campaign* (1855), a narrative of the Crimean War; *Wellington's Career* (1860); *Voltaire* (1877); *The War in the Crimea* (1890). He was also the author of a popular novel, *Lady Lee's Widowhood*, and the admirable sketch entitled *Shakespeare's Funeral*.

HAM'LIN, Alfred Dwight Foster, American architect: b. Constantinople, Turkey, 1855, Sep. 5. He is a son of Cyrus Hamlin (q.v.). He was graduated from Amherst in 1875, studied architecture in the Massachusetts Institute of Technology in 1876–7 and at the Beaux Arts of Paris in 1878–81, and in 1883 became special assistant in Columbia University. In 1889 he became assistant professor of architecture at Columbia, in 1891 adjunct professor and in 1904 full professor. His published works include: *A History of Architecture* (1896); a *Handbook of the History of Ornament; European and Japanese Gardens* (1902); etc.

HAMLIN, Augustus Choate, American surgeon: b. Columbia, Maine, 1829, Aug. 28; d. Bangor, Me., 1905, Nov. 19. He was graduated from Bowdoin in 1851, from the Harvard Medical School in 1855, was appointed assistant surgeon to the 2d Maine infantry in 1861, and from 1863 until mustered out in 1865, lieutenant-colonel and medical inspector, United States army. Subsequent to the war he practiced in Bangor, of which he was twice mayor, and in 1882–6 was surgeon-general of Maine. Among his works are: *Martyria* (1866); *The Tourmaline* (1873); *Leisure Hours Among the Gems* (1884); and treatises on *Transfusion* (1868); *Tetanus* (1868); and *The Transmission of Disease* (1870); and *Life of Gen. Gustave P. Cluseret* (1903); etc.

HAMLIN, *hăm'lĭn*, Cyrus, d.d., ll.d.: educator: b. Waterford, Me., 1811, Jan. 5; d. 1900, Aug. 8. He graduated at Bowdoin College 1834, and the Bangor Theol. Seminary (Congl.) 1837, was a missionary of the A. B. C. F. M. in Turkey 1837–60, was chosen pres. of Robert College in Constantinople 1860, and resigned 1876; returned to the United States, and became prof. of dogmatic theology in Bangor Theological Seminary 1877; president of Middlebury College 1880, and retired from active labor 1885. He published (in Armenian) in Constantinople Upham's *Mental Philosophy; Papists and Protestants* (1847) *Arithmetics for Armenians* (1848), in Turkish translation (1870); and a critical review of Abp. Matteos's writings (1863); *Among the Turks* (New York 1877), and *My Life and Times* (1893). He received the degree dd.

from Harvard College 1861, and LL.D. from the Univ. of the City of New York 1870.

HAM'LIN, HANNIBAL, LL.D.: 1809, Aug. 17—1891, July 4; b. Paris, Me.: statesman. He was brought up on his father's farm; learned the printer's trade; studied law; was admitted to the bar 1833, was a member of the state legislature 1836–40 and 1847, and speaker 1837–39 and 1840; was unsuccessful democratic candidate for congress 1840, and successful 1842 and 44; became U. S. senator to fill vacancy 1848, and for full term 1851; resigned on being elected governor of Maine as a republican 1857; resigned as governor the same year on being re-elected U. S. senator; and resigned from the senate 1861, Jan., having been elected vice-president on the ticket with Abraham Lincoln. By virtue of this office he presided over the senate 1861, Mar.—1865, Mar., and soon after retiring was appointed collector of the port of Boston. He was re-elected U. S. senator 1869 and 75, and was U. S. minister to Spain 1881–83. He served as regent of the Smithsonian Institution 1861–65 and 1870–82, and was many years a dean of the board. He received the degree LL.D. from Colby University.

HAM'LINE, LEONIDAS LENT, American Methodist bishop: b. Burlington, Conn., 1797, May 10; d. Mount Pleasant, Iowa, 1865, Mar. 23. He was educated for the ministry, but afterward studied law, was admitted to the bar at Lancaster, Ohio, was licensed to preach by the Methodist Church, and was a traveling minister in the Ohio conference. When in 1844 the Methodist Church divided on the slavery question, he was one of the members of the general conference, and drafted the plan for the separation of the northern and southern branches. He was a bishop from 1844 to 1852, when he was retired at his own request. His *Works* were edited by F. G. Hibbard (1809). Hamline University of Minnesota was named in his honor.

HAMLINE UNIVERSITY, a coeducational institutional at Hamline, Minn., between Minneapolis and Saint Paul. The school was established, under the auspices of the Methodist Episcopal Church, at Redwig, Minn., but it was closed in 1869. In 1880 it was reopened at Hamline. In 1906 there were connected with the school 20 professors and instructors in the college of liberal arts and 50 in the medical department. In the preparatory school there were about 125 students, in the college of liberal arts about 210, and in the medical department 161 students. There were 7,000 volumes in the library, and the endowment was $200,000.

HAMMEL, n. *hăm'ĕl*, or HEMMEL, n. *hĕm'ĕl* [Ger. *hammel*, a castrated sheep: Bav. *hämmel*, a wether—from *hamal*, to mutilate: Icel. *hamla*, to hinder from doing: Scot. *hamelan*, domestic—from *hame*, home: AS. *ham*, home; the idea being the place where animals disabled or mutilated are kept, a home]: in *Scot.*, an open shed or court for cattle; *prov. Eng.*, a shed or hovel for cattle;

a covered shed with racks for straw or hay, with a doorway into a small open court, which court is fitted up with a manger for turnips and a trough for water, as for horse or cattle.

HAMMER, n. *hăm'mĕr* [Ger. and Dut. *hammer;* Icel. *hamar*, a hammer: a word imitative of the sound of blows]: a striking instrument; instrument for driving nails, etc., usually consisting of an iron head faced with steel, fixed crosswise on a wooden handle; when one side of the head is thinned out to a wedge form (sometimes bent, and with a V-shaped notch for drawing nails) or to a point, this is called the *pane* of the hammer: the face is the disk that strikes. When the face is slightly convex; instead of flat, the hammer is said to be *bell-faced*. Hammers have many modifications in form for various kinds of work: see FORGING: FILE-CUTTING, GOLD-BEATING: ETC.: V. to beat or forge with a hammer. HAM'MERING, imp. N. the act of striking with a hammer. HAM'MERED, pp. *-mĕrd*. HAMMER-BEAM, tie-beam, a portion of an open timber roof, forming a truss at the foot of the rafter, which gives strength and elegance to the construction. The appearance is as if there had been a tie clear across, and the central part being cut out, the remnants at each end form the hammer-beam. The end projecting into the apartment is usually ornamented with shields, heads, pendants, etc. HAMMER-CLOTH, cloth which covers a coach-box or driver's seat: now seldom used; so called because originally the box contained a hammer, nails, etc., for repairs on the coach during a journey—though it is by some deemed a corruption of hammock-cloth, the seat which the cloth covers being formed of straps or webbing stretched between two-crutches, as a sailor's hammock is suspended: also, the *hammer* is said by some to be a corruption of Dut. *hemel*, heaven, a tester or covering, from a misapprehension of its real meaning: Icel. *hamar*, a covering—see Skeat: it is suggested also that the word may be a mere corruption of *hamper* or *hanaper-cloth*, as hampers were often carried with a cover. To HAMMER AWAY, to be busy. To HAMMER OUT, to work or contrive in the mind, to work by keeping in motion or agitation. To BRING TO THE HAMMER, to put up for auction.

HAMMER, STEAM, or POWER: tool, or machine for applying the force of impact by a blow from a mass heavier than a man can wield. A great variety of power-hammers are used. These, for the most part, are masses of iron raised by steam or other power, and then allowed to fall by their own gravity upon the work. The *helve* or *shingling hammer*, used for compressing the mass of iron drawn from the puddling furnace, and the tilt-*hammer*, used in the manufacture of shear-steel, are important examples of such hammers. The first is a heavy bar of cast iron about ten ft. long, weighing three or four tons or more, to which is attached a head of wrought iron faced with steel, weighing nearly half a ton additional: it works upon an axis at the end of the bar furthest from the head, and is

raised by cams attached to a heavy wheel set in motion by steam or water power; these cams strike or 'lick' a projection extending beyond the head, and thus raise it about 18 or 20 inches at the rate of 70 to 100 times per minute. The tilt-hammer is similar, but much lighter, and is adapted for striking more than 300 blows per minute: in order to obtain this velocity, a short 'tail' extends with a downward inclination beyond the axis, and the cams strike this downward, and thus lift the longer arm of the lever to which the head is attached. These, when worked by steam, as they usually are, are, of course, steam-hammers; but when the term steam-hammer is used without qualification, it applies to a more elaborate machine of very different construction, invented by James Nasmyth 1842, and subsequently improved in minor details. In this, the hammer is attached to the bottom of a heavy mass of iron, the 'hammer-block,' capable of rising and falling between upright bars or 'guides;' this, again, is fixed to the rod of a piston, which works in a cylinder placed perpendicularly over the hammer-block, hammer, and anvil. As the piston rises in the cylinder, it lifts the attached mass, which is then allowed to fall from varying heights, according to an adjustment which can be made by an attendant simply touching a handle. The adjustments are so perfect that it may be made to crush a mass of iron, and at the next blow to crack a nut held in the fingers without damaging either kernel or fingers, or to crack the top of an egg in an egg cup, as might be done with the bowl of a spoon. One novel contrivance, in this elaborate mechanism, viz., the 'latch,' which reverses the action of the steam-valves at the precise moment required, is of remarkable ingenuity.

In the first 'Nasmyths' used, the weight of the descending mass—viz., the hammer-block, hammer, etc.—was 30 to 60 cwts., and they were justly regarded as mechanical marvels. Steam hammers with a descending mass of 20 to 50 tons have since been constructed. In comparing the power of these with the 'helve' or other hammers, which descend by angular motion on a pivot, it must be remembered that these latter, when formed of a straight bar, are effective only to the extent of a body of one-third of their weight falling directly from a corresponding height, on account of the fact that the whole bar forming the hammer is moving with a velocity varying from nothing at the axis, to a maximum at the end of the bar, where the hammer-face is fixed.

HAMMER-HEAD, or Hammer-headed Shark (*Zygæna* or *Sphyrna*): genus of fishes of the great family of Sharks; having the general form and characters of the family; but distinguished from all other fishes by the extraordinary form of the head, which, in the adults, resembles a double-headed hammer, being extended on both sides to a considerable length, and having the eyes at the ends of the lateral extensions. The mouth is below the centre of the head. The hammer-headed form is not nearly so perfect in the young as in the adults. It is supposed to be intended for

enlargement of the sphere of vision. In the fetal state, the lateral extensions are doubled upon themselves. The hammer-heads are ovo-viviparous, and produce many (about 40) young at a birth. They are most abundant in tropical seas, particularly in the Atlantic. In the Bight of Benin, 'they may often be seen ascending from the clear blue depths of the ocean like a great cloud.' They are very voracious. Some attain great size. One species (*Z. malleus*), attains a length of 12 ft. or more.

HAMMOCK, n. *hăm'mŏk* [Peruvian and Sp. *hamaca*]: apparatus in which a sailor slings his bed: thence any swinging or suspended couch, often for out-door use in summer. A sailor's hammock consists of a rectangular piece of hempen cloth, about six ft. long and three in width, gathered together at each end by means of cords and a clew, and hung to hooks under the deck. The hammock thus forms a sort of bag capable of containing the sailor's mattress, his blankets, and himself as soon as he has acquired the not easy knack of climbing into it. The hammocks are taken below at sunset, and hung in rows, about two ft. apart, in the men's portion of the ship. When done with in the morning, the bedding is carefully tied up within each, and the whole stowed in the hammock-netting, generally in the bulwarks of the waist, unless the weather be wet. In recent times the hammock has become very popular for domestic use, especially in the United States, being hung on verandas and balconies and under the trees on the lawns of private estates during the summer months. These hammocks for home use are made of various materials, but usually of cotton cord or manilla hemp. They are dyed in bright colors and are made very attractive and picturesque.

HAMMOND: city, Lake co., Ind., abt. 20 m. s.e. from Chicago; on the Grand Calumet river, and on the Erie, the Pennsylvania, the Michigan Central, and other railroads, exporting the products of the surrounding farming region and of the city's manufacturing interests; these include slaughtering and meat packing plants, tanneries, starch, glue, chemical, steel spring, and nail factories, foundries, distilleries, flour mills, and brick yards. The city owns and operates its waterworks, has gas and electric lighting plants, and street railroads, fine schools, churches, etc., and developed rapidly after 1890. It was settled in 1869 and incorporated in 1883. Pop. (1910) 20,925.

HAMMOND, John Hays, American mining engineer: b. San Francisco, 1855, Mar. 31; After graduation at the Sheffield Scientific School Yale Univ. 1876, and mining studies at the Royal School, Freiburg, Saxony, he was appointed expert for examining gold mines in California, on the U. S. Geol. Survey, acted as superintendent and consulting engineer in various parts of No. and So. America, and became consulting engineer in the transvaal, So. Afrfca 1893, where he was sentenced to death by the Boers, but escaped by payment of a fine. He afterwards

settled in New York as manager of the Guggenheim Mining Exploration Co.

HAMMOND, *hăm'ond*, SAMUEL: b. Richmond co., Va., 1757, Sep. 11—1842, Sep. 11. He served in the Indian campaign with Gov. Dunmore, with the cavalry through the revolutionary war chiefly in the south; was surveyor-gen. of Georgia after the war, fought in the Creek war 1793, was member of congress as a democrat 1803–05, milit. and civil commandant of Upper La., and part of the time receiver of public moneys 1805–24, surveyor-gen. of Georgia, 1825, and sec. of state, 1831–35.

HAM'MOND, WILLIAM ALEXANDER, M.D.: physician: b. Annapolis, Md., 1828, Aug. 28; d. Washington, D. C., 1900, Jan. 5. He graduated at the Univ. of the City of New York as M.D. 1848, entered the U. S. army as asst. surg. 1849, and resigned 1860, Oct. to become prof. of anatomy and physiology in the Univ. of Md. In 1861, May, he was reappointed asst. surg. in the army, and 1862, Apr., became surg. gen. in the army with the rank of brig.-gen. In this office he showed great energy and large executive ability, reorganized the medical and surgical service, established the army and medical museum, and planned *The Medical and Surgical History of the Rebellion*. In 1864, Aug., he was dismissed from the army after a court martial trial of charges of official irregularities, but 1879, Aug., was restored as surg.gen. and brig.gen. on the retired list by the pres. at the direction of congress. On leaving the army he removed to New York, became specialist on the diseases of the nervous system, was prof. of that branch in the medical college of Bellevue Hospital 1867–73 and in the med. dept. of the Univ. of the City of New York 1873–82, and was a founder of the New York Post-Graduate Medical School (1882), with which he was for many years connected. Among his publications are included: *Military Hygiene* (1863); *Sleep and Its Nervous Derangements* (1869); *Diseases of the Nervous System* (1871); *Neurological Contributions*, etc.,and the novels, *Robert Severne; A Strong-Minded Woman; A Son of Perdition; Doctor Grattan* (1884); *Mr. Oldmixon*, etc.

HAMMURABI, *hăm-ô-râ'bē:* founder of the Babylonian Empire, whose code of laws, discovered at Susa by J. De Morgan (1901–2), gave rise to much literature on its relationship to the Mosaic code. Identical perhaps with Amraphel, Abraham's co-temporary mentioned in Genesis xiv. 9, the sixth king in Babylon's first dynasty, he was successful in war and established the empire, with Babylon its capital, making it a city of high importance. Of course, details are scanty as to the golden age under his sway—inscriptions refer to his activity as a builder of canals and temples. His date is given as 2267–2213. His code of laws is the oldest document in human history and the most valuable of Babylonian inscriptions. It is a collection of laws without continuity or any system, but throws light on early Oriental conditions. It deals with manual labor, architecture, ship-building, commerce, and agricul-

ture, with regulations concerning marriage, inheritance, property and punishments—such statutes revealing similarity to Pentateuchal laws; the slave, however, is shown less deference, and in general, Hammurabi's code cannot compare in humanity with the Mosaic system. There is no protection of the weak, no mercy to animals, no limitation on wealth, no principle of self-restraint, in fine, no spirit of love and consideration. However, there is marked advance over earlier civilization—the provisions on the whole indicate an enlightened ruler. Especially to be noted is Hammurabi's opposition to spells and enchantments. A spirited discussion on Babylon and the Bible sprang from Prof. Fried. Delitzsch's lecture on the subject before the Emperor of Germany (*Babel und Bibel*, Leipzig, 1903) and a number of works and monographs have appeared in English, German and French which have proved the superiority of the Mosaic code to that of Hammurabi.

HAMON, *â-mōng'*, Jean Louis: 1821, May 5—1874, May 29; b. Plouha, France: painter. Early in life he entered a monastery with the intention of studying for the Rom. Cath. priesthood; but escaped and went to Paris 1840, and studied painting with Paul Delaroche and G. C. Gleyre. In 1848 he made his first exhibition in the Marseilles Museum with *The Tomb of Christ* and *Over the Gate*. He painted steadily a year, then discouraged because his works attracted little public notice entered the porcelain manufactory at Sèvres, and there speedily achieved renown by his exquisite designs for vases. At the London exposition of 1851 an enamelled casket of his gained a medal, and with this encouragement he returned to painting on canvas. In 1852 he sent to the salon his *Comedy of Humanity*, which attracted attention. His next work, *My Sister is not at Home*, was bought by the govt. and secured a 3d-class medal for him. From this time he painted with great rapidity and produced many pictures teeming with poetic sentiment and classical fancies that have been widely circulated in engraved form. He received a 2d-class medal and became a chevalier of the Legion of Honor for his contributions to the Paris exposition 1855. A few years before his death he established a studio on the shores of the Mediterranean. His other works include *Love and his Cortege*, *The Captive Butterfly*, *Aurora*, *Love on a Visit*, *It is Not I*, *The Maidens at Lesbos*, and *The Muses at Pompeii*.

HAMOON. See Seistan, Lake of.

HAMOUS, a. *hā'mŭs* [L. *hamus*, a hook]: in *bot.*, having the end hooked or curved.

HAMPDEN, *hămp'dĕn*, John: celebrated English patriot: 1594–1643, June 24; said to have been born in London; son of William Hampden of Hampden, Buckinghamshire, and Elizabeth, daughter of Sir Henry Cromwell of Hinchingbrooke, Huntingdonshire, aunt of Oliver Cromwell. His father died when Hampden was only three years

old. In 1609, he was entered a gentleman commoner at Magdalen College, Oxford, and 1613 was admitted to the Inner Temple, where he made considerable progress in the study of law. 1621, Jan. 30, he entered the house of commons as member for the now disfranchised borough of Grampound. He attached himself to the party of St. John, Selden, Coke, Pym, and those who opposed the arbitrary encroachments of the crown, but at first took no forward part in public business, and spoke but seldom. In the first three parliaments of Charles I., he sat for Wendover. In 1627, for refusing to pay his proportion of the general loan which the king attempted to raise on his own authority, Hampden was committed to close imprisonment in the Gatehouse. Subsequently, he was removed to Hampshire, but, with 76 others, unconditionally liberated by an order of council. His activity and industry in parliament now rendered him one of its leading and most useful members; he was on most of its committees; but after the dissolution of the parliament of 1628–9, he retired to his estate and devoted himself to study and to country sports and occupations. Charles, claiming the power to tax the country in any way he thought proper, had recourse to the impost of ship-money 1634. At first limited to London and the maritime towns, and levied only in war, it was, 1636, extended to inland places in time of peace, when Hampden resolutely refused to pay it, and his example was followed by nearly the whole county of Buckingham. In 1637, he was prosecuted before the court of exchequer for non-payment, when a majority of the judges gave verdict against him. In the short parliament of 1640, Hampden was prominent in the great contest between the crown and the house of commons. To the long parliament he was returned both for Wendover and the county of Buckingham, and chose the latter. For his resistance to the king's proceedings, he was one of the five members whom Charles, 1642, Jan. 4, rashly attempted in person to seize in the house of commons; and on the breaking out of the civil war, he raised and became colonel of a regiment in the parliamentary army under the Earl of Essex. He was also a member of the committee of public safety, and in the prosecution of the war, constantly advised prompt and energetic measures, against the hesitating policy of Essex. He was present at the repulse of the royalists at Southam, at their defeat near Aylesbury, at the fight at Edgehill, and at the assault and capture of Reading. Prince Rupert having attacked a parliamentary force at Chinnor, near Thame, Hampden put himself in the head of a few cavalry that were rallied in haste to oppose Rupert, and in the fight that ensued at Chalgrove Field, received in the first charge a wound, of which he died six days afterward.

HAMPDEN-SIDNEY COLLEGE, *hămp'dĕn-sĭd'nĭ kŏl'lĕj:* in Prince Edward co., Va., 70 m. w.s.w. of Richmond: founded by the Presbytery of Hanover 1775, incorporated by the Va. legislature 1783, and erected on grounds given

by Peter Johnston 1773. James Madison, Patrick Henry, Paul Carrington, William Cabell, Sr., and Nathaniel Venable were among the incorporators. The original grounds have been increased by gift and purchase till they aggregate 250 acres. It is undenominational in govt., and instruction, though affiliated with the Presb. Church, has always maintained a high standard of scholarship, and allows the student a large share in its govt. In 1906 instruction was given by 7 professors. There were 117 students and 15,000 volumes in the library.

HAMPER, n. *hăm'pėr* [mid. L. *hănăpērĭŭm*, a receptacle for cups: OF. *hanap*, a drinking-vessel—from mid. L. *hanăpus*, a drinking-cup]: a large basket for carrying articles of produce to market.

HAMPER, v. *hăm'pėr* [Dut. *haperen*, to stammer, to stick fast; *hapering*, a hindrance: Ger. *hapern*, to stop: Scot. *habble*, disturbance, a fix]: to shackle; to impede in motion or progress; to perplex or embarrass; to entangle: N. an incumbrance. HAM'PERING, imp. HAM'PERED, pp. *-pėrd*. *Note.*—HAMPER may have the same origin as HAMBLE, and be only another spelling of it: Scot. *hammle*, to walk in an ungainly manner: Icel. *hamla*, to mutilate.

HAMPSHIRE, *hămp'shėr*, or SOUTHAMPTON, *sŭth-hămp'-ton*, or familiarly HANTS, *hănts:* maritime county in s. England; bounded w. by Dorset and Wilts, n. by Berks, e. by Surrey and Sussex, s. by the English Channel; area, including the Isle of Wight, nearly 1,613 sq. m. Pop. (1901) 459,508. Surface is irregular, being traversed by North and South Downs. The s.w. portion of the county, almost wholly detached from the main portion by the Southampton Water, is occupied mainly by the New Forest, 64,000 acres in extent, the property of the crown, and valuable for its supply of oak and beech timber for the British navy. Within the forest, an aboriginal breed of pony is still found. There are remains also of the forests of Bére, Alice Holt, Woolmer, etc. The principal rivers are the Anton or the Test, and the Itchen, which flow s. through the county into the Southampton Water; and the Avon, also flowing s., and forming the w. boundary of the New Forest. The climate of the county is in general mild; and favorable to vegetation; indeed, the climate in the s. of the Isle of Wight is supposed to be milder than that of any other portion of Great Britain. The soil consists in part of poor sands and gravel, and of a mixture of stiff clay and chalk. All the usual crops are produced, hops are cultivated, and the bacon cured here is famous. The manufactures of the county are inconsiderable. Southampton and Portsmouth, both termini of important railways, are chief centres of trade. The New Forest seems to have been fatal to the family of William the Conqueror; there two of his sons, and his grandson, met with sudden and violent deaths. Of the early ages of English history, Hampshire contains many interesting relics: of these the chief are Portchester Castle, at the head of Portsmouth

Harbor; Calshot and Hurst Castle, now occupied as coast-guard stations, erected in the time of Henry VIII., and Netley and Beaulieu Abbeys, and the Priory of St. Dionysius, all in the neighborhood of Southampton. The county is exceedingly rich in Roman remains, as coins, urns, pottery, etc.

HAMPSTEAD, *hămp'stĕd:* borough of London, county of Middlesex, England, situated on a range of hills 4 m. n.n.w. of St. Paul's. It was formerly famous for its medicinal springs, and is still a favorite place of residence and of holiday resort among Londoners, attracted by the beauty of its situation and the purity of its air. On the summit of the hill, above the village, is the Heath, which affords extensive and pleasant prospects of the surrounding country. On the Hampstead road, and in the vicinity of the village, many villas have been erected. A house on the Heath, formerly called the Upper Flask Inn, and now a private residence, was at one time the resort of the famous Kit-Kat Club, at which Steele, Addison, Richardson, and others used to assemble. The village of Hampstead was much frequented by Pope, Gay, Johnson, and Akenside, and later by Byron, Leigh Hunt, and Joanna Baillie. Pop. of dist. (1901) 81,902.

HAMPTON, *hămp'ton:* town and capital of Elizabeth City co., Va.; on the Chesapeake Bay, giving its name to Hampton Roads (q.v.), a southerly branch of Chesapeake Bay, and mouth of James river. The harbor is one of the best on the American coast, defended by Fortress Monroe and Fort Calhoun. Hampton is 2 m. from Fortress Monroe; and being near the fine beach of Old Point Comfort, and having a climate tempered by the sea, is a favorite resort in summer, and in late winter. Pop. (1910) 5,505. See HAMPTON NORMAL AND AGRICULTURAL INSTITUTE.

HAMP'TON: village of England, county of Middlesex, pleasantly situated on the left bank of the Thames, about 12 m. s.w. of London. The streets are narrow, and the houses irregularly built; in the vicinity, however, there are many noble mansions and beautiful villas. Pop. 4,476.

HAMPTON COURT PALACE, long a royal residence, now usually occupied by persons of rank, reduced in estate, stands about a mile from the village grounds that extends to the Thames. The original palace was erected by Cardinal Wolsey, and came into the possession of Henry VIII., who enlarged it, and formed around it a royal park or chase, which he stocked with deer. Here Edward VI. was born, and here his mother, Queen Jane Seymour, died. Charles I. underwent a portion of his confinement at this palace, and it was the occasional residence of Cromwell, Charles II., and James II. A considerable portion of it was rebuilt by William III., and by him the park and gardens were laid out in the formal Dutch style. The palace, as it now stands, consists of three quadrangles with some smaller courts; the great eastern and southern

fronts having been erected by Sir Christopher Wren. The picture-gallery comprises Lely's Beauties of the Court of Charles II., valuable specimens of Holbein, Kneller, West, etc., and above all, seven unequalled cartoons by Raphael. The gardens, about 44 acres, not materially altered since they were laid out by William III., present a series of curious raised terraces, formal flower-pots, and long shady and trim arcades. Among the attractions of the garden is a 'maze' or labyrinth. Extensive repairs on the palace were made 1880.

HAMP'TON, Wade: 1754–1835, Feb. 4; b. S. C.: soldier. He served through the revolutionary war with Gens. Sumter and Marion; was member of congress as a democrat 1795–97, 1803–05; presidential elector 1801; appointed col. U. S. army, 1808, brig.gen. 1809, and maj.gen. 1813; in command at New Orleans 1809–12; and on the Canadian frontier 1813–14; resigned 1814, Apr.; and spent the remainder of his life managing his great estate in S. C. At the time of his death he was considered the richest planter in the United States, and his estate comprised 3,000 slaves.

HAMPTON, Wade, American soldier: b. Columbia, S. C., 1818, Mar. 28; d. there 1902, Apr. 11. He was graduated from the University of South Carolina, studied law but never practised, managed extensive plantations in South Carolina and Mississippi, served in both houses of the state legislature, but, as a Union Democrat, was not popular among South Carolinians. At the beginning of the Civil War, he formed and equipped at his own expense the command of cavalry, infantry, and artillery known as *Hampton's legion*. With this he won distinction at the first Bull Run and at Seven Pines, where half his troops were killed and himself severely wounded. Having been made brigadier-general of cavalry and assigned to J. E. B. Stuart's command, he took part in Lee's advance northward (1863), was prominent at Gettysburg, and later brilliantly opposed Sheridan's progress in the Shenandoah valley. He attained the rank of lieutenant-general in 1864, and was placed in command of Lee's entire cavalry forces. In 1865 he commanded J. E. Johnston's cavalry, and endeavored to prevent Sherman's northward advance from Savannah. After the war he was an active reconstructionist; in 1876 was nominated as the Democratic candidate for governor, and, after a contest regarding the election with D. H. Chamberlain, the Republican nominee, served until 1878, when he entered the United States Senate. He was in the Senate until 1891, and in 1893–7 was United States commissioner of railroads.

HAMP'TON COURT CONFERENCE: ecclesiastical conference at Hampton Court, shortly after the accession of James I. to the throne of England, in order to the settlement of disputes concerning the national church. The king presided and took a principal part in the conference. He was attended by some of the nobility and highest offi-

at or near the entrance to the bay. Since the civil war the locality has become popular as a summer and winter resort, and as a stopping place for northern invalids on the way to and from Fla. Its attractions include the beach bathing-places, and promenades of Old Point Comfort; the famous Fortress Monroe (q.v.)—much of which is open to the public daily—the old village of Hampton, with its Normal and Agricultural Institute, National Home for Disabled Soldiers and Sailors, and U. S. National Cemetery; and unsurpassed facilities for short excursions, fishing, and yachting. In 1861, Apr., the Confederates seized the U. S. frigate *Merrimac* at Norfolk, covered her hull with railroad iron, and, under the name of *The Virginia*, sent her to attack the U. S. vessels lying in Hampton Roads 1862, Mar. 8. She rammed the frigate *Cumberland*, which sank in 45 minutes; forced the *Congress* on the Shoal, where she was disabled, set on fire, and blown up; but was prevented by her draft from getting within striking distance of the *Minnesota*. On the following morning she reappeared to attack the *Minnesota*, and was suddenly confronted by the new Union iron-clad *Monitor*, just arrived from New York. The *Virginia* rammed the *Monitor* at full speed once, but without inflicting any damage excepting to her own prow, and then steamed off toward Norfolk. The Union loss in killed, drowned, wounded, and prisoners was 286; the Confederate in killed and wounded about 20.

HAMSTER, n. *hăm'stẽr* [Ger. *hamster*], (*Cricetus*): genus of rodent quadrupeds of the family *Muridæ*, resembling the true mice and rats in their dentition, but having cheek-pouches, and a short hairy tail. The Common Hamster (*Cricetus vulgaris*) is a native of n. Europe and n. Asia, abundant in many parts of Germany and Poland, but not found in Britain, and rare w. of the Rhine. It is of variable color; though generally reddish gray above, the belly black, the feet white, and large white spots on the sides, throat, and breast. It is larger and stouter than the common rat, the tail only about three inches long. It burrows in dry soils, each individual making a burrow for itself, to which there are more entrances than one, and which also contains several holes or compartments, one of them lined with straw or hay, in which it sleeps, and some of them capacious enough for the storing of large quantities of grain or other provisions—to the amount of 60 pounds of corn or a hundredweight of beans—which the animal carries thither in its cheek-pouches, and on which it feeds during the milder parts of winter, spending the most severe part of that season in a state of torpid hibernation. It is a great pest to the farmers of the countries in which it abounds, and the object of their unceasing hostility; but it is very prolific, producing two or three broods in the year, and 16 or 18 at a birth. It feeds generally on vegetable food, as leaves, seed, etc., though it is said also sometimes to devour small quadrupeds, birds, lizards, frogs, etc. The hamster carries away pease and other legumes in pod, but shells them and deposits only the

edible portion in its store. Its labors and depredations are wrought by night. It is extremely fierce and pugnacious, and exhibits more than the pertinacity of the bull-dog. The skins of hamsters are of some value. There are several other smaller species of the genus, mostly Asiatic.

HAMULOSE, a. *hăm′ū-lōs* [L. *hāmŭlus*, a small hook —from *hāmŭs*, a hook]: in *bot.*, covered with little hooks. HAMULUS, n. *hăm′ū-lŭs*, a hooked bristle; in *anat.*, a hook-like process. HAMULAR, a. *hăm′ū-lėr*, in *anat.*, having a hook-like appearance; having small hooks. See HAMOUS.

HAN, *hân:* the most celebrated of the 26 dynasties of China (B.C. 206—A.D. 220), founded by Kau-tsu, whose accession to the empire is regarded as the commencement of Chinese modern history. The number and character of its heroes and literati are superior to most other periods, and to this day the term *Sons of Han* is the favorite and most common appellation of the Chinese to themselves.

HANAFORD, PHEBE ANN: an American minister; b. in Nantucket, Mass., 1829, May 6; became a teacher and writer at fifteen; ordained in Universalist church in 1868, being the first woman to become a member of the Universalist clergy; held pastorates in Hingham and Waltham, Mass., Hartford, Conn., and Jersey City, N. J.; and was a member and officer of many literary and temperance societies. Her works include *Life of Abraham Lincoln; Life of George Peabody; Lucretia the Quakeress; Leonette, or Truth Sought and Found; The Best of Books and its History; Frank Nelson, the Runaway Boy; The Soldier's Daughter; Field, Gunboat and Hospital; Women of the Century; From Shore to Shore, and Other Poems,* etc.

HANAU, *hâ′now:* industrious and flourishing town in the Prussian province of Hessen-Nassau, near the confluence of the Kinzig and the Main, 12 m. e.n.e. of Frankfurt by rail. It is divided into the Old and New Town, the latter founded 1597, by Prot. refugees from Belgium, who introduced the manufacture of woolen and silken goods, which still flourishes. The town of Hanau stands pre-eminent in Germany for its jewellery, and gold and silver wares, it has also extensive manufactories of carpets. gloves, leather, cards, paper, hats, cutlery, tobacco, and cigars. Hanau has broad and straight streets: the buildings most worthy of note are the ancient castle; a gymnasium, in which the Wetterau Library is located; and the electoral palace of Philippsruhe, famed for its orangeries, and once the property of Napoleon's sister, Princess Pauline Borghese. In the neighborhood of the town, and on the left bank of the Main, are the baths of Wilhelmsbad and the village of Rumpenheim, with its palace and gardens. Hanau was the scene of the last battles which Napoleon fought in Germany, 1813, Oct. 30, 31, when, in his retreat from Leipsic, after a hard-fought battle, he totally defeated the allies. Pop. 30,000.

HANBALITES, n. *hăn'ba-līts* [from Ahmed Ibin *Hanbal*, 8th c.]: Mohammedan sect, branch of the Sunnites.

HANCES, n. plu. *hăn'sēs* [see HAUNCH]: the ends of elliptical arches; in a *ship*, the falls of the poop-balusters.

HANCHINOL, *hăn'chĭn-ol* (*Heimia salicifolia*): a plant of nat. ord. *Lythaceæ*, with lanceolate, frequently ternate leaves, and flowers on one-flowered stalks. It is a native of Mexico, and is much esteemed as a medicine for its very powerful sudorific and diuretic properties. It is highly extolled as an antisyphilitic.

HANCOCK, *hăn'kok*, JOHN, LL.D.: 1737, Jan. 12—1793, Oct. 8; b. Quincy, Mass.: signer of the Declaration of Independence. He was a son of the Rev. John Hancock, and nephew of Thomas Hancock; graduated at Harvard College 1754; entered his uncle's counting-house, and inherited his business and the greater part of his fortune. In 1760 he witnessed the coronation of George III.; 1766 was elected a member of the Mass. legislature; 1768 had his vessel *Liberty* seized by the royal commissioners of customs for an alleged evasion of the commercial laws, the seizure leading to a riot; and 1770 he delivered a powerful address at the funeral of the victims of the Boston massacre, and served on the committee of citizens who demanded of the royal gov. the removal of the troops from the city. His fearlessness made him a marked man, and his fellow-patriots were quick to avail themselves of his influence and co-operation. He was elected a member of the provincial congress 1774, became its pres., and with Samuel Adams, a colleague, was the object of the royal expedition to Concord which led to the battle of Lexington 1775, Apr. Both of these patriots were excluded by name in Gen. Gage's offer of pardon. Hancock was a member of the continental congress 1775–80, 1785–6, and pres. 1775, May—1777, Oct. He was one of the first signers of the Declaration of Independence, and the first publication of it bore only his name as pres. of congress. In 1776 he became maj.gen. of Mass. Militia; 1778 commanded the Mass. troops in the R. I. expedition; 1780 was a member of the state constitutional convention; 1780–85, 1787–93 gov. of Mass.; and 1789 received 4 electoral votes in the presidential election. He received the degree LL.D. from Brown Univ. 1788 and Harvard College 1792.

HANCOCK, WINFIELD SCOTT, LL.D.: 1824, Feb. 14—1886, Feb. 9; b. Montgomery Square, Montgomery co., Penn.: soldier. He was educated in the Norristown (Penn.) high school and acad., graduated at the U. S. Milit. Acad., 1844, brevetted 2d lieut. 6th U. S. inf., and was on duty in the Indian Terr. and on the Mexican frontier till the summer of 1847, when he accompanied Gen. Scott's army on the march to Mexico City. He took part in the battles of San Antonio, Churubusco, Molino del Rey, and Contreras, and the assault and capture of the capital; and

was brevetted 1st lieut. for conspicuous gallantry. He was quartermaster and adjt. of his regt. chiefly at St. Louis 1848–55, was promoted capt. and ordered on the Seminole campaign in Fla. 1855; served through the troubles in Kan. 1857–8; and was stationed in Cal. 1859–61. In 1861, Sep., he was appointed brig.gen. of vols., and spent the autumn and winter aiding the organization of the Army of the Potomac. He was one of the most conspicuous and successful generals in the peninsular and Md. campaigns; received brevets of maj., lieut.col., and col. U. S. A. for services at Williamsburg, Golding's Farm, Garnett's Hill, Savage's Station, White Oak Swamp, Centreville, South Mountain, and Antietam; commanded the 1st div. 2d corps in the second day's Antietam battle, and was promoted maj.gen. of vols. 1862, Nov. 29. He led his div. in the storming of Marye's Heights, Fredericksburg, 1862, Dec. 13, and at Chancellorsville 1863, May, was given command of the second corps; 1863, June, selected the battle-ground of Gettysburg, fought through the two first days there, and after repulsing Gen. Lee's final assault on the third day fell wounded. He received the thanks of Congress for his Gettysburg services and was compelled by his wound to remain inactive till 1863, Dec. After a recruiting mission to the north he resumed command 1864, Mar.; was in the battles of the Wilderness (May 5–7), the Po (10), and Spottsylvania Court House (12), where he made a famous charge and captured 4,000 prisoners, 20 cannons, and several thousand small arms; and thence till June 17 crossed the North Anna, was in the second battle of Cold Harbor, and the assault on the Petersburg lines. He was promoted brig.gen., U. S. A., 1864, Aug. 12, commanded in the actions at Deep Bottom, Ream's Station, and Boydton Plank Road; and 1864, Nov. 26—1865, Feb. 26, was engaged in recruiting a veteran corps of 50,000 men. After the assassination of Pres. Lincoln he was in command of Washington; 1865, July—1866, Aug., of the middle dept.; 1866, Aug.—1867, Sep., of the dept. of Mo.; 1867, Sep.—1868, Mar., of the dept. of the Gulf; 1868, Mar.—1869, Mar., of the div. of the Atlantic; 1869–72, of the dept. of Dak.; 1872 till his death, of the div of the Atlantic. He was promoted maj.gen., U. S. A., 1866, July 26, defeated as democratic candidate for pres. by Gen. Garfield, 1880, Nov.; and was commander of the milit. funeral of Gen. Grant, 1885.

HANCOCK: village in Houghton co., Mich., on Lake Portage whence a ship canal affords communication with Lake Superior, and on the Duluth, South Shore and Atlantic railroad, opposite Houghton, about 100 m. n.w. of Marquette. Hancock was settled in 1859 and incorporated in 1863. It is situated in the Lake Superior copper belt near the Calumet and Hecla mines and has smelters, stamp-mills, foundries, machine-shops, lumber, brick-yards, and municipal waterworks. A Finnish college is situated here, and Hancock has good schools, churches, and a fine public park. Pop. (1900) 4,050.

HANCOCK: village in Delaware co., New York; at the confluence of the main branches of the Delaware river, and on the Erie, New York, Ohio and Western r. rs., 50 m. e.s.e. of Binghamton. It is a trade centre for the surrounding farm region and neighboring valuable blue-stone quarries, and has lumber-yards, flour mills, tanneries, and a wood alcohol factory. Pop.(1910) 1,329.

HANCOCK, Mount: a peak of the Big Game Range, 10,235 ft. high, near the Wyoming boundary, and on the western fringe of the Two Ocean plateau, a portion of the continental divide, in the southern part of Yellowstone National Park. The Snake River rises on the eastern slope and in its initial course almost encircles the mountain.

HAND, n. *hănd* [Icel. *hönd;* Goth. *handus;* Ger. *hand*, the hand—probably named as the instrument of seizing: Icel. *henda;* L. *prehendĕrĕ*, to seize]: *literally*, the part of the body which seizes and holds; the broad extremity of the arm below the wrist; the palm and fingers; side; part; act; power; agency; style of writing; a workman; cards held in a game; a measure of four inches used in measuring the height of horses=a hand's breadth: V. to give or transmit with the hand; to guide or lead by the hand; to manage; to furl, said of a sail: Adj. pertaining to or used by the hand—much used as the first element of a compound word. Hand'ing, imp. Hand'ed, pp.: Adj. having the greater power or dexterity in one of the hands. Hand'less, a. useless with the hands. Hand'ful, n. *-fûl*, as much as the closed hand will contain; a small number. Clean hands, innocence; blamelessness. Hand-barrow, a barrow carried with the hands having two handles at each end; also applied to the barrow with one wheel driven with the hands. Handbill, a small printed sheet distributed to persons by hand, or from house to house. Handbook, an elementary book easily carried and used; a manual; a guide for travellers. Hand's-breadth, a measure of 4 inches. Hand-fasting, anc. English term for betrothment, now disused. Hand-gallop, an easy gallop in which the rate of speed is regulated by pressing the bridle with the hand. Hand-gear, the contrivances for working steam-engine valves. Hands high, measure of height by the hand's breadth, applied to a horse. Hand-holes, holes provided in the shells of steam boilers in cases where a mudhole is impracticable, though which the hand may be introduced for purposes of cleaning and repair. Handing, making symmetrical work right and left hand respectively, and the changing of patterns from right to left hand, and from left to right hand. Hand-lead, among *seamen*, the instrument for sounding when passing through shallow-water. Handloom, *-lôm*, a loom not worked by steam, as opposed to *power-loom*, one worked by steam. Hand-made, made by the hand and not by a machine. Hand-rail, a rail supported by balusters, as in staircases. Hand-rails of a locomotive, brass or iron pipes attached by brackets or studs to the upper part of the boiler, and ex-

tending from the cab to the smoke-box. They are used by the engineer in getting on or off the running-board. HAND-SPIKE, *spīk*, a wooden lever used by seamen in turning the capstan. HANDWRITING, the form of writing peculiar to a person; any writing (see HANDWRITING, in Law). AT HAND, near; within reach. BY HAND, with the hands; not by tools or instruments, etc. FROM HAND TO HAND, from one person to another. HAND IN HAND, in union; conjointly. HAND TO HAND, close union; close fight. HANDS OFF, keep off; forbear. IN HAND, present payment; in possession; in the state of execution; in a state of discipline; under restraint. LAYING ON OF HANDS, a form used in consecrating, setting apart, or blessing, by placing the hands upon (see HANDS, IMPOSITION OF). OFF-HAND, without delay, hesitation, or difficulty; immediately. OFF ONE'S HANDS, out of one's possession or care. ON HAND, in present possession. ON ALL HANDS, on every side; by all parties. OUT OF HAND, immediately. PUTTING THE HAND UNDER THE THIGH, an anc. ceremony used in swearing. HEAVY HAND, with much severity; great trouble and distress. LIGHT HAND, with gentleness; without severity. RIGHT HAND, place of honor or power. SLACK HAND, idleness; carelessness. STRICT HAND, severe discipline, rigorous government. TO HIS OR MY HAND, in readiness; already prepared. UNDER HIS OR MY HAND, with the proper writing or signature of the name. TO BE HAND AND GLOVE, to be intimate and familiar with. TO BEAR A HAND, to give help quickly. TO BEAR IN HAND, in *OE.*, to elude. TO BRING UP BY HAND, to rear, as a lamb, without suckling it. TO CHANGE HANDS, to change sides or owners. TO CLAP HANDS, to express joy. TO COME TO HAND, to be received. TO GIVE ONE'S HAND IN MARRIAGE, to take in marriage; to marry. TO HAND DOWN, to transmit in succession. TO HAVE A HAND IN, to have a part or concern in doing. TO HAVE ONE'S HANDS FULL, to be pressed by much labor or by many engagements. TO KISS THE HAND, to worship idols; to bid an affectionate adieu. TO LAY HANDS ON, to seize. TO LEND A HAND, to give assistance. TO LIVE FROM HAND TO MOUTH, to live barely and uncertainly as to the supply of daily food; to live up fully to one's income, or upon daily resources alone. TO SET THE HAND TO, to engage in. TO STRIKE HANDS, to make a contract; to become surety for. TO TAKE IN HAND, to attempt; to undertake. TO WASH ONE'S HANDS, to withdraw from an affair.

HAND, THE: bodily organ of man which seizes and holds. The genus *Homo*, or MAN, takes rank in the classification of mammals as a distinct order, BIMANA, in consequence of man being the only animal possessing *two hands*. At first sight it might be considered that four-handed animals—the monkeys, apes, and their allies, which are placed by zoologists in the order QUADRUMANA—were superior to those which possess only two hands, but this is far from the fact. None of these four hands are adapted to the variety of actions which the human hand

is capable of performing, and they all are, to some degree, required for support and locomotion; so that while in the higher forms of the quadrumana the extremities present an approximation in structure to those of man, in the lower they gradually tend to resemble the ordinary quadrupedal type. 'That,' says Cuvier, 'which constitutes the *hand*, properly so called, is the faculty of opposing the thumb to the other fingers, so as to seize upon the most minute objects—a faculty which is carried to its highest degree of perfection in man, in whom the whole anterior extremity is free, and can be employed in prehension.' The peculiar prehensile power of the human hand is dependent chiefly on the length, power, and mobility of the thumb, which can be brought into exact opposition to the extremities of all the fingers, whether separately or grouped together.

Before describing the hand itself, a few words are requisite on the upper extremity generally, of which the hand may be regarded as the essential part.

The general arrangement of the bones of the arm is shown in fig. 1. The general plan of the osseous framework of the upper and lower limb is very similar. The

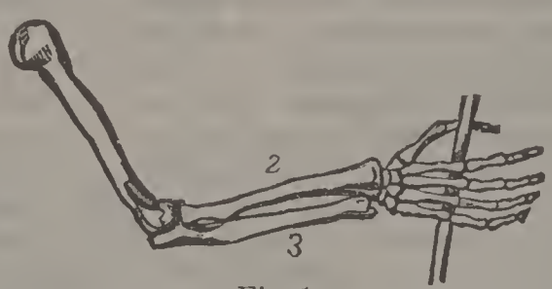


Fig. 1.

1, the humerus; 2, the radius; 3, the ulna. Beyond the distal ends of the radius and ulna come the carpal bones, the metacarpal bones, and the phalanges.

humerus or arm-bone corresponds to the *femur* or thigh-bone; the lower end of the humerus is connected with the two bones of the forearm, the *radius* and the *ulna*, which correspond with the two bones of the leg. Then come the *carpal* bones, the *metacarpal* bones, and the *phalanges*, just as in the foot are *tarsal* bones, *metatarsal* bones, and *phalanges*.

In fig. 2 (from Humphrey's *Human Foot and Human Hand*) is a diagram showing the way in which the bones of the hand are arranged. The carpal bones (3 to 10 in the figure) are eight in number, arranged in the wrist in two rows. The first or upper row consists practically of three bones (3, 4, 5), the fourth (6) being regarded as belonging to the class of *Sesamoid Bones* (q.v.), and the second row consists of four bones (7, 8, 9, 10); so that, excluding the pisiform bone (6), the carpal and the tarsal bones correspond in number. As we commonly term the palm the *front* of the hand, the thumb becomes conventionally the *outer*, and the little-finger the *inner* digit; but according to the rules of comparative anatomy, and in order to compare the hand and foot, we ought to reverse these terms. The

outer (3) of the carpal bones of the first row supports (through the intervention of 7 and 8) the bones of the thumb and forefinger (I and II), and constitutes with them the *outer* division of the hand. The inner (5) of the carpal bones bears the little, and the next (the ring) finger (V. and IV), and constitutes with them the *inner* division of the hand, while the middle one (4) bears the middle-finger (III), and belongs to the *middle* division of the hand. We see from this figure, likewise from fig. 1, that the two outer bones (3 and 4) are connected with the radius, while the

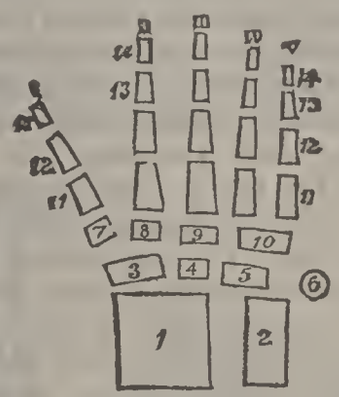


Fig. 2.

Diagram of the bones of the hand, with the ends of the radius and ulna.

1, end of radius; 2, end of ulna; 3, scaphoid; 4, semilunar; **5**, cuneiform; 6, pisiform; 7, trapezium; 8, trapezoid; 9, magnum; 10, unciform; 11, 11, metacarpal bones; 12, 12, first row of phalanges; 13, 13, second row; 14, 14, third row; I, thumb; II, forefinger, etc.; V, little-finger.

inner bone (5) is connected (indirectly by a thick ligament) with the ulna.

Anatomical details regarding the individual carpal bones are unnecessary here. Collectively, they are so arranged that the carpus presents a dorsal convex surface, on which the tendons of the extensor muscles of the fingers play, and a palmar concave surface on which the tendons of the flexor muscles lie. The several bones are joined to one another—each bone being united to three or more others—by a large extent of surface, and are girded together by strong ligamentous bands. The wrist is thus as strong as if it had been constructed of one solid piece of bone, while the slight gliding movements which occur between the several bones give it an elasticity which serves to break the shocks that result from falls upon the hand. The uppermost surface of the first row of carpal bones is convex, and this convex surface is received into a wide cup or socket, formed by the lower articular surface of the radius, and by a ligament passing from that bone to the ulna.

The metacarpal bones and the phalanges require no special description. Like the great-toe, the thumb has only two phalanges, while each of the other digits has three.

The various movements of which the hand is capable, may be divided into (1) the different directions in which

the hand collectively can be moved; (2) the movements of which the hand itself, without reference to the arm, is capable.

The *scapula* or shoulder-blade, with which the principal arm-bone articulates, is itself movable to a considerable extent on the surface of the ribs on which it rests. Again, the socket in which the nearly spherical head of the *humerus* or arm-bone lies is very shallow—not unlike the cup in the well-known toy *cup-and-ball*—and the arrangements of the shoulder-joint generally are such as to permit so great a variety, and so extensive a range of movements, that we are able to apply the hand to almost every part of the body. This freedom of motion is due in great degree to the clavicles or collar-bones, which, by steadying the shoulder-blades, and keeping the shoulders apart, afford a fixed point for the various muscles which we employ in raising the arms, in folding them over the chest, in the act of hugging, etc. The movement at the next junction of bones, the elbow-joint, is very different from that at the shoulder. The shoulder is termed, from its construction, a ball-and-socket joint, and admits of motion in all directions, within definite limits; while the elbow is a hinge-joint, and merely admits of bending and straightening, or, in other words, of motion in one plane. We have next to consider a class of movements of the forearm and hand to which there is nothing analogous (at least to any material extent) in the leg. The movements in question are called 'pronation and supination.' In *pronation* (derived from *pronus*, with the face downward), we turn the palm of the hand downward, as in picking up any substance from the table; in *supination* (derived from *supinus*, with the face upward), we turn the palm upward, as for the purpose of receiving anything that may be placed in it.

These movements of pronation and supination are so important to the usefulness of the hand, that we must notice the three muscles by which they are chiefly affected. One of the three muscles (A, fig. 3) passes from a projecting process on the inner side of the arm-bone, at its lower end, to the outer edge of the middle of the radius. Its contraction causes the radius to roll over, or in front of, the ulna: it thus pronates the hand and is called a *pronator* muscle. Another muscle (B, fig. 4) passes from a projecting process on the outer side of the arm-bone to the inner edge of the radius near its upper part. It runs therefore in an opposite direction to the former muscle, and produces an opposite effect, rolling the radius and the hand back into the position of supination: hence it is called a *supinator* muscle. The third is a very powerful muscle, termed the *Biceps* (q.v.), which not only bends the elbow, but from the mode in which its tendon is inserted into the inner side of the radius (see fig. 5), 'also rotates the radius so as to supinate the hand; and it gives great power to that movement. When we turn a screw, or drive a gimlet, or draw a cork, we always employ the *supinating* movement of the hand for the purpose; and all screws, gimlets, and imple-

ments of the like kind are made to turn in a manner suited to that movement of the right hand; because mechanicians have observed that we have more power to supinate the hand than to pronate it.' Supination can be performed to its full extent only by man, and even in man it is not the natural or habitual position; monkeys can partially effect the movement, and in most of the lower animals the part corresponding anatomically to the hand is constantly in a state of pronation.

The movements of which the hand itself, without reference to the arm, is capable, are very numerous, and in this respect differ considerably from the corresponding movements of the foot. Thus we can bend the fingers down

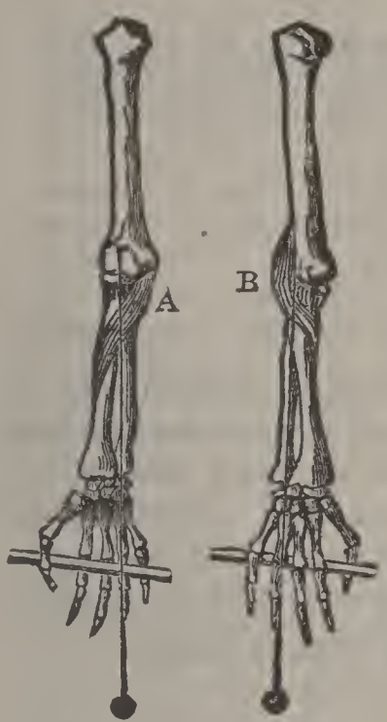


Fig. 3. Fig. 4.

Fig. 3.

The upper limb, with the forearm and hand in state of supination.
A, the long supinator muscle.

Fig. 4.

The same in a state of pronation.
B, the short supinator muscle.

In both figures, a plumb-line from the outer condyle of the humerus is found to traverse the lower end of the ulna and the ring-finger.

(From Humphry, *Op. cit.*)

upon the palm, or we can extend them beyond the straight line; we can separate them from one another to a considerable extent, and we can close them with considerable force. The wrist and hand are bent forward or flexed upon the forearm by three muscles which pass downward from the inner condyle or expanded end of the humerus, and are termed by the *radial flexor*, the *ulnar flexor*, and the *long palmar* muscles. The first two of these muscles are inserted into wrist-bones on the radial and ulnar sides respectively, while the third expands into a fan-like *fascia* or membrane in the palm of the hand, and thus serves both to support the skin of the palm and to protect the nerves and vessels which lie below it. Beneath the palmar fascia lie two sets of *flexor* muscles of the fingers, and they present so beautiful a mechanical arrangement as to merit special notice.

The *superficial* or *perforated flexor* muscle passes down the front of the forearm and divides into four tendons,

which become apparent after the removal of the palmar fascia, and are inserted into the second phalanges of the fingers, each tendon splitting at its termination, to give passage to the similar tendons of the *deep* or *perforating flexor* muscle which passes from the upper part of the ulna to be inserted into the last phalanx of each finger. This arrangement of the tendons of the superficial and deep flexor muscles is shown in fig. 6. These *flexor* muscles are antagonized by the *common extensor* muscle of the fingers, which, like the flexors, divides into four tendons, one for each finger. Besides these there is a special *extensor* of the

Fig. 5.

The superficial muscles of the forearm.

1, the lower part of the biceps; 2, its tendon, a little above its insertion into the radius; 5, the radial flexor of the wrist; 6, the long palmar muscle, spreading out (at 9) into the palmar fascia; 8, the ulnar flexor of the wrist; 13, the long supinator muscle.

index finger, and a series of muscles forming the ball of the thumb, which move that organ in almost every direction, and various small slips giving lateral and other movements to the fingers.

The hand is very richly supplied with blood-vessels and nerves. There is no other part of the body where the sense of touch is so acute as at the tips of the fingers; for the special arrangements which make this part of the hand peculiarly important in relation to our knowledge of external objects, see TOUCH, ORGANS AND SENSE OF.

Our notice of the comparative anatomy of the foot (q.v.) renders it unnecessary to trace the modifications presented in the lower animals by the bones corresponding to those of the human hand; as the carpal and metacarpal bones with their phalanges undergo adaptations of form to meet the individual wants of the animal, much in the same

Fig. 6.

To show the perforation of one of the tendons of the superficial flexor muscle (which is inserted into the second phalanx), in order to allow the corresponding tendon of the deep flexor to pass onwards to be inserted in the last phalanx.

manner as the tarsal and metatarsal bones and their phalanges. Thus, it is readily seen that the so-called knee of the horse, for example, is the carpus; and the metacarpal bones and phalanges can be traced. See BROKEN KNEES; HORSE.

HANDCUFFS, n. *hănd'kŭfs* [*hand*, and *cuff* 2: OE. *cops*, a fetter, *coffes*, cuffs]: a ring or chain to confine the hands; a manacle. HANDCUFF, v. to confine the hands with a ring or chain; to manacle. HAND'CUFFING, imp. HAND'CUFFED, pp. *-kŭft*.

HÄNDEL, *hĕn'dĕl*, GEORGE FREDERICK: 1685, Feb. 23—1759, Apr. 13, b. Halle, Upper Saxony: one of the greatest of musical composers and musicians. Though a native of Germany, he spent so large a portion of his life in England, where he composed his greatest wofks, that Britain may almost claim him as her own. Certainly his influence on English musical development is almost unequalled. In one sense, he turned it from its proper national style into his own grand yet foreign channel. He manifested in infancy an extraordinary passion for music, and at the age of seven, having accompanied his father on a visit to the Duke of Saxe-Weissenfels, he found his way to an organ, where he was heard by the duke, who remonstrated with his father against further opposition to a genius of so decided a character. He was then placed under a music teacher, Zachau, with whom he remained until he was thirteen, composing every week cantatas for the church-service, and learning all instruments, especially the organ. In 1698, he was sent to Berlin, where the Elector of Brandenburg was so impressed with his talents that he wished to send him to Italy. As his father would not accept this offer, he returned to Halle, whence on the death of his father, he went to Hamburg 1703. Here he played a violin in the orchestra of the opera. He was soon its director, and composed his first opera, *Almira*, rapidly followed by *Nero* and *Florinda*.

His violent temper involved him in a quarrel with a brother composer, which resulted in a duel, the sword of his adversary was stopped by a button or a music score. He next visited Italy. In Florence he composed *Rodrigo*, 1707. His *Agrippina*, composed in Venice, had a run of 30 nights. At Rome he received at Cardinal Ottoboni's where he heard Corelli, and beat him with his own violin, for not playing to suit him in his *Il Trionfo del Tempo*. In 1710, he returned to Germany, where he was appointed chapel-master to the Elector of Hanover, afterward George I. of England. At the close of the same year Händel went to England, where he was patronized by Queen Anne and the nobility. He composed *Rinaldo*, *Pastor Fido*, *Theseus* and 1715, *Amadis da Gaula*, in which Nicolini and Valentini first sang in England. In 1718 he undertook the direction of the Duke of Chandos's chapel at Cannons, where he wrote *Acis and Galatea*, *Esther*, the first English oratorio and numerous concertos, anthems, fugues, etc. A Royal Acad. of Music for the cultivation of the opera, was formed 1720, and after some competition, was placed under Händel's management. This undertaking and other opera speculations, in which Händel was engaged, proved unsuccessful. Händel lost £10,000, and was compelled to retire to Aix-la-Chapelle on account of his health. The oratorio *Deborah* was composed 1733, and was followed by *Alexander's Feast*, *Saul*, *Israel in Egypt*, and (1740) *L'Allegro e Penseroso*. In the end of 1741 he went to Dublin, where his *Messiah*, composed in that year was produced for charitable purposes. He remained in Dublin about nine months, and received generous support. From this time success attended all his undertakings. On his return to London he composed his *Samson;* and the *Messiah* was performed for the benefit of the Foundling Hospital. It was repeated annually for the same purpose, and from 1749 to 1777 brought to that charity £10,300. The *Messiah* has been called 'the musical equivalent of Milton's *Paradise Lost*.' Händel became blind, but he still composed, and played on the organ, being led to his seat, and forward to receive the plaudits of the audience. He assisted at the performance of one of his oratorios Apr. 6; and he died as he wished, on Good Friday, 1759, Apr. 13,'in hopes,' he said, 'of meeting his good God, his sweet lord and Savior, on the day of his resurrection.' Among his works, which are in the Queen's Library, are 50 operas— 8 German, 26 Italian, 16 English; 20 oratorios, a great quantity of church-music, cantatas, songs, and instrumental pieces. He was a wonderful musician, and his compositions are often full of grandeur and sublimity. His operas are seldom performed, but his oratorios hold the same place in music that in English drama is accorded to the plays of Shakespeare; and the Händel festivals, lasting several days, are the grandest musical exhibitions of our times. Händel was a man of high intelligence and wide literary culture. He was upright and outspoken, qualities which sometimes brought him into personal antagonism, especially with

careless or indolent performers, or with those who were willing to pander to a low public taste. See Chrysander's *Georg Friedrich Händel* (1858-67). Also *Lives*, by Rochstro (1883) and Whittingham (1882).

HANDICAP, v. *hăn'dĭ-kăp* [*hand-in-cap*]: to weigh or bear down by a weight; to place on such a footing as to have an equal chance. HAN'DICAPPING, imp. HAN'DICAPPED, pp. *-kăpt*. HAN'DICAPPER, n. *-kăp-ẽr*, one who settles the conditions so as to equalize the chances of success. HANDICAP, n. *hăn'dĭ-kăp*, a race in which the horses carry different weights according to age and character for speed, or are placed at different distances, or start at different times, etc., with the view of equalizing the chances as nearly as possible: the term is said to have been originally applied to the method of settling a bargain by putting a *hand* with money into a *cap*. *Handicapping* in various games and sports, denotes the placing of competitors, good, bad, and mediocre, on such a footing that all shall have, as nearly as possible, an equal chance of winning. Thus, in horse-racing, where the speed of one horse has been ascertained to be greatly superior to that of another, the swifter of the two, in a handicap race, is made to carry extra weight to an amount that shall be deemed sufficient to reduce its speed to equality with that of its antagonist. Where the public performances of a horse have been exceptionally good, and when both speed and endurance are found to be unusually great, the penalty inflicted in all future handicaps is very great, amounting sometimes to a weight considerably above that of very inferior competitors. The *beau idéal* of a handicap would thus be one in which the merits of the animals should be so nicely discriminated, and the weights so accurately adjusted, that all the competitors should pass the winning post at the same time, and thus run a 'dead heat'. This is of course, impossible in practice but it is nevertheless the ideal at which the handicapper must aim; and the nearer he approaches it the more perfect is his work.

Though principally pertaining to horse-racing, handicapping is resorted to in many other sports. In pigeon-shooting from traps, the shooter stands, as a rule, 21 yards from the traps, that being the distance usually allowed to average performers. The more skillful the shooter, the further back he has to stand from the traps: the distance allowed by an acknowledged 'crack' shot to his inferiors ranging from 1 to 10 or even 15 yards. In games such as chess and draughts, certain 'men' are taken away from the superior player; in billiards, the better of two allows his antagonist a certain number of 'points' so as to equalize or handicap their respective games. In swimming and in pedestrianism, the inferior competitors are allowed a certain 'law' or start; in yachting, the vessel of greater tonnage is handicapped with lesser ones, by allowing them extra time for the performance of the race.

HANDICRAFT, n. *hăn'dĭ-krăft* [AS. *handcræft: handy*, and *craft*]: work performed by the hand; in *OE.*, a work-

man: Adj. belonging to a trade. Han'dicraftsman, n. an artisan; a mechanic.

HANDIWORK, n. *hăn'dĭ-wėrk* [AS. *handgeweorc*—from *hand; geweorc* or *weorc*, work]; work of the hands; work of skill or wisdom.

HANDKERCHIEF, n. *hăn'kér-chĭf* [*hand* and *kerchief*]: a piece of cloth, usually silk or linen, carried in the pocket or worn around the neck.

HANDLE, n. *hăn'dl* [Ger. *handeln;* Dut. *handelen;* Icel. *höndla*, to act, to trade: AS. *handlian*, to touch—from *hand*]: that part of anything held in the hand when used; that of which use is made; the instrument by which a purpose is effected: V. to feel, use, or hold with the hand; to make familiar by frequent touching; to treat or discourse on; to treat or use well or ill; to manage. Handling, imp. *hănd'lĭng:* N. in the *fine arts*, the method of manipulation peculiar to each artist in the use of his pencil. Handled, pp. *hăn'dld.* Handle to his name, *slang*, a title, as Doctor, Sir, Lord, etc.

HANDMAID, n. *hănd'mād*, or Hand'maiden, n. *-mā'dn* [*hand*, and *maid*, or *maiden*]: a female servant or attendant.

HANDSEL, or Hansel, n. *hăn'sĭl* [AS. *hand-syllan*, a striking of hands, a giving of the hand in token of conclusion: Icel. *handsal*, an agreement upon which hands have been joined, a settled contract—from AS. *syllan;* Icel. *selia*, to give or bestow]: an earnest; money for the first thing sold; something given or done to make good a contract; in *Scot.*, a gift conferred at a particular season, as at shortly after the New Year: V. to pay an earnest; to use anything for the first time; the first money received for goods. Hand'selling, imp. Hand'selled, pp. *-sĭld.* Handsel-Monday, in *Scot.*, the first Monday of the year, on which servants and children receive presents.

HANDSOME, a. *hănd'sŭm* [Ger. *handsam*, convenient; Dut. *handsaem*, dexterous, convenient]: having a well-proportioned and pleasing figure; beautiful or elegant; ample, large, generous. Hand'somely, ad. *-lĭ.* Hand'someness, n. beauty; elegance; grace.—Syn. of 'handsome': beautiful; lovely; fine; agreeable; pleasing; comely; nice; good-looking; becoming; appropriate; liberal; noble; ready; gainly; graceful.

HAND-TREE, (*Cheirostemon platanoides*): large tree of nat. ord. *Sterculiaceæ*, which receives its name from the peculiar appearance of its flowers. These have no corolla, but a large 5-lobed and angular colored calyx—bright red within—from which project the five stamens, united by their filaments into a column, and separating and curving at the summit, where they bear the anthers, so as to have some resemblance to a hand or claw. The tree is an object of interest from the fact also that it is superstitiously venerated by the Mexicans; a single tree near the Toluca, mentioned in the earliest histories, being asserted by them to be the only one in the world, and their eager gathering of

its flowers always preventing its multiplication by seed. It was not till 1801 that cuttings were obtained from it for the Botanic Garden of Mexico, where the young plants have since produced seed abundantly. The tree has been found in Guatamala also. It is a lofty tree with a thick trunk, a habit similar to that of a plane, and broad maple-like leaves.

HANDWRITING. Several interesting psychological questions arise from a consideration of handwriting. The development of handwriting in the child seems to spring from his interest in imitative drawing, and to proceed by the association of certain visible forms with certain movements. The characteristics of a person's handwriting are perhaps indicative of his character (see GRAPHOLOGY); they are at any rate fairly stable and unavoidable by the person—so much so that a person can not successfully disguise his hand, even though he should write with his left hand. The reason for this is perhaps found in the probable fact that there is a certain region of the brain cortex in the neighborhood of the region for the control of the right hand, and also near the 'speech centre', which controls writing; if it be destroyed, writing with either hand is impossible.

HANDWRITING, STUDY OF. Handwriting includes all marks made by a human being for the purpose of recalling an idea to himself or conveying one to other human beings. In this wider sense it would include scratching, cutting or staining bark, wood, stone, wax, papyrus, paper, or any other substance. But in its narrower and usual sense, for which, in recent times, with singular inappropriateness, palæography has been employed, it is confined to the marks made by means of a coloring material applied by brush, pointed stick, pen or pencil, to a surface adapted to receive them. In the bibliography to this article will be found references to the principal sources of information as to the growth of this necessary art from its earliest periods in India and Egypt, through those of classical antiquity and the middle ages, with their palimpsests, monkish improvements, and adornment by illumination, to its development into different styles, and the commingling and influence of each upon the other.

The history of the introduction of Roman script from Ireland to the North of England, shows there already existed another script separately derived.

This pursuit of the changes and modifications in the art of hand-made symbols and characters, including the evolution of the various alphabets from earlier and simpler forms, and the varieties of these forms in each language, constitutes the historical study of handwriting which belongs equally to philology.

The artistic study of handwriting (or calligraphy) concerns itself with beautiful forms, and the proper manner of producing them.

The kind of study of handwriting considered here is that of which the object is to determine the characteristics, and

to decide questions of authorship, and is strictly a branch of experimental psychology.

If we regard any physical act of a conscious living being, whether human or not, it resolves itself into (1) a picture of a certain condition of things in the mind; (2) the will to make a change in those conditions; (3) the peculiar sequence of motions by which it must effect this change; (4) the expenditure of the necessary power to produce the motions in certain parts of the body and thus bring about this change; (5) the guiding of this instrument by intelligence to perform the required motions. Here are five elements necessary to the simplest act. Not only is this the case, but in living beings four of them, the thinking, willing, production of power, and exercise of direction, fluctuate continually during very minute intervals of time, and the instrument itself changes in efficiency, though generally more slowly; so that if we had the means of representing each of these elements by a symbol indicating its efficiency (that is its strength or weakness, perfection or imperfection, in any act accomplished by the combination of all four), we should almost certainly find one or more, and possibly all, of these values changed in any repetition of that act.

This change, however slight, would affect their relations to each other and would inevitably cause some change in the result.

If this be true, it is a sufficient explanation of the conceded fact that no two things can be made exactly alike.

And this is not astonishing when we reflect that the five elements above mentioned represent the conditions due partly to psychical and partly to physical forces; for even when the conditions are purely physical, as in the production of a heap of sand below the narrow tube of an hour glass, or the condensation of a drop of water from moist air on a cool surface, only a sufficiently minute scrutiny is needed to detect differences between any two heaps made in the same hour glass, or any two drops condensed from the same steam on the same surface.

It may then be assumed that no living thing can exactly duplicate any act it may have performed, nor can such exact duplication be obtained by mechanical means; yet each act of an agent will produce in the result characteristics distinguishing it from the results of the acts of all other agents.

In treating this subject it is unfortunately unavoidably necessary to pay what must seem exaggerated attention to 'experts' past and present, because although most of them have never employed scientific methods, they constitute the only class which has dealt with the analysis of hand writing; the calligraphers, illuminators and writing-masters having confined themselves to its construction or synthesis.

A certain Raveneau, 1656 (whose only predecessor was Damelle in 1609), wrote a treatise on the ubject. He complained of the lack of science of his colleagues which, how-

ever little or great, put him into jail for forgery shortly afterwards. Robert Prud'homme (1639), de Bligny (1699), Vallain (1761),d'Autrèpe (1770), and Jumel (1790), were authorities in the 18th c. in France.

In the 19th c. appeared an essay by Saintomer (1832), a little work by Levéque (1840), and a pamphlet (1880) on *The Vicious Method of Expertism in Writing*, by the Abbé Michon, the founder of modern 'Graphology'. Vogt, *Handwriting from the Physiological Point of View*, (1880); Javal,'*The Mechanism of Writing*' (1881); A. Binet, various very interesting studies published in the bulletin of the laboratory of experimental psychology; Frazer, *The Study of Documents* (*U. S.*, 1894). A book on *Le Faux devant l'Histoire*, etc., by Gustave Itasse, appeared in the year 1898 (De la Grave, Paris).

In Germany neither experts nor handwriting critics are wanting. In special branches of the main subject Germany has furnished, as in so many other branches of applied science, the most valuable contributions. Thus Sittl, of Munich, has contributed important suggestions for determining the fact and the character of alterations in parchments, and the relative ages of parchments and inks; Neumann and Schluttig have given valuable contributions on the manufacture of inks; and there are many others.

Among the sworn judicial handwriting experts, W. Langenbruch, of Berlin, who, with the co-operation of Sanitation Counselor, Dr. A. Erlmeyer of Bendorf on the Rhine, and Professor Dr. W. Preyer, formerly of Weisbaden, issued a monthly sheet called *Die Handschrift* (or *Handwriting*) from April to December inclusive, 1895, which contained some interesting contributions and illustrations. Throughout many of the discussions of this subject in Germany, the assumed foundation for Graphology is everywhere apparent, as is the same assumption of the French experts that there is nothing in any handwriting so characteristic and individual as not to be found in some other.

Messrs. Charles Chabot and F. C. Netherclift were famous English experts in 1871, in which year appeared a monumental volume by the Hon. Edward Twisleton on the comparison of the handwriting of Sir Philip Francis and Junius.

Of the principal points of view from which handwriting has been regarded, the oldest is purely physical, and concerned with superficial or pictorial features. One of the more modern (Graphology, q. v.) occupies itself exclusively with the interpretation of handwriting into a description of character. As to this latter, it has been very recently thoroughly analysed by one of the founders of psychological experimentation, Dr. Alfred Binet, Director of the Laboratory of Psychological Research in the Sorbonne, with negative results.

From the earliest times the methods used by connoisseurs in judging of works of art were employed by hand-

writing experts. The expert looking at the genuine and a suspected piece of handwriting used to say, without adducing reasons, that in his opinion they were or were not by the same hand. Later the examiners compared the minute details of letters and marks and found bases for their decisions in the curls, crossings, dots, and shadings, etc.; briefly, in all that appealed to the eye without the aid of accurate measurement and definition.

Scientific Methods.—These may be of two kinds, the one simply intended to furnish information on one or more points of a particular case, and the other to supply a basis for a systematic analysis of handwriting. The instances of the first use of science are innumerable and have been made in nearly every case where a scientific man has been asked to aid in an investigation of this sort. The second kind of application is experimental psychology pure and simple.

Special Applications.—In the 60's of the last century there was a will purporting to be signed by Sylvia Ann Howland which was examined by Professor Benjamin Peirce, of Harvard. He measured the geometrical positions of 30 downstrokes in 42 unquestioned signatures and found 5,325 coincidences of position in two signatures out of 25,850 comparisons, say 1 in 5. Comparing the two disputed signatures with one genuine he found all the 30 downstrokes coincided. By the calculus of probabilities he deduced the chance of these 30 coincidences occurring simultaneously to be one in 2,666,000,000,000,000,000!

Of this result he said: This number far transcends human experience. So vast an improbability is practically an impossibility, less than those least things which the law cares not for. * * * * The coincidence must have had its origin in an intention to produce it, i.e., it was a forgery by tracing.

An application of elementary reasoning to the detection of forgery was made by Sittl, of Münich, who found on the paper of a document dated 1868 a water-mark representing the eagle of the present German Empire, which did not come into being until after the war with France in 1870.

Another such application, aided by a simple experiment was made during a famous will trial. A will presented for probate in 1878 professed to have been written in 1875, and the ink marks were of that rusty brown color which is frequently noticed in writings of that age and over, due to the oxidation of the iron which is an important ingredient of ordinary inks. The best imitation of this color is a pigment or paint never used for a writing fluid, which contains practically no iron. It occurred to the chemist who first saw the paper that a test for iron in the written characters of the will would show whether the change of color was natural or merely imitated, and it proved to be the latter.

A fluorescence test showed that a writing dated in 1862 was written with Eosine ink, and as Eosine was not dis-

covered till eight years afterwards, the writing was necessarily a forgery.

Photographs of writing by transmitted light have frequently shown water-marks and differences between the parts which are not visible to the naked eye.

Dr. Stéphane Minovici, professor at the University of Bucarest, in a paper read before the Fourth International Congress of Applied Chemistry, held in Paris, 1900, July 25, recorded a large number of cases where photography aided in the detection of, or satisfactorily demonstrated falsifications of writings.

A device for determining questions which may be of value in an investigation is a prism colorimeter for fixing the color value of inks. No ink is really black, and most inks are distinctly mixed with some coloring matter, usually blue; but almost all inks show more or less yellow and red also. A close coincidence of the color values of two ink marks will establish the identity of the writing fluid with which they were made.

Another useful method for determining which of two crossed lines is above and which beneath, depends upon the fact that when light falls upon a surface at a very acute angle it is totally reflected and reveals the true outline of the surface of a mark on which it falls, no matter how transparent the film composing that mark may be. If a very black ink line underlie a very pale one it will be impossible by looking down on it to determine which of the two is uppermost. But when illuminated by light falling very obliquely to the surface the order in which the lines have been traced becomes perfectly apparent.

The extent to which the writing of one person may be modified by another grasping the same pen is an extremely interesting study. From the results of experiments undertaken it is by no means impossible that a minute examination of such joint writing may frequently suggest the two persons concerned in making it.

In two crosses of which the margins of one were ragged and of the other smooth it was claimed that in both cases the hand of the person whose mark was being made touched the pen-handle, while another person made the mark. 3,500 crosses made under these conditions, were examined under the microscope without the discovery of a single instance where one or both margins of the line so made were not crooked and irregular, and one margin not continuously so.

The effect of the involuntary rotation of a pencil in the hand to supply a fresh point when the first point is abraded; and the different directions of rotation unconsciously employed by different writers aid in identifying them.

These are but a few examples of the application of scientific observation to the identification of special characteristics in handwriting.

Application of Scientific Methods to the Entire Subject of the Study of Handwriting. Bibliotics.—There are in all writings by the same person two features invariably pres-

ent; the one a constant tendency to reproduce original forms which have become a habit, which differ from the forms of other writers and therefore are individual characteristics; the other, a modification or omission of one or more of these (usually numerous) characteristics in any given word or letter. These two features are quite analogous to the two biological 'laws' which govern the production of plants and animals, called by Darwin 'heredity' and 'accidental variation.' It is therefore indisputable that the best means of identifying the writer of a document is to discover what are the constitutional divergences of his handwriting, and to separate these constitutional divergences from the casual variations from his habit which exist in every specimen from his pen. The surest and most obvious way to do this is to secure from a number of specimens of his writings the model of each of the characteristic features.

This may be done in various ways, and when accomplished, the sporadic changes from his usual style will be eliminated, and a type secured containing all, or at least most, of his characteristics.

First of all in deciding questions of authorship the need of as perfect a standard as possible is apparent.

Composites.—In 1881 Francis Galton had read a paper before the Photographic Society of Great Britain, and shortly afterwards published, his *Human Faculty*, in which the marvelous results in graphic averages representing types, are shown in families, in professions, in disease, and in crime, by composite photographs. For the methods to be employed consult his book.

In the early 80's the principle of composite photography was applied to signatures and thus a tpye,—the type—obtained which the writer had always tried to achieve without quite succeeding, by which the doubtful signature could be judged.

Ratios of Averages.—One of the best means for deciding authorship in handwriting is that of exact measurements of lengths of words, and groups of letters; heights of certain letters in the words; and the calculation of the ratio to each other of these two latter factors. When such ratios are obtained from the averages of a large number of genuine writings and compared with similar ratios of unknown writings the question of identity of the writer of the two sets will usually be answered.

An investigation of this kind applied to the writing of Sir Philip Francis and to that of Junius was published in 1901; the word 'more' being taken (*Bibliotics*, 3d ed. 1901, p. 146). While the average lengths of this word in 36 instances by Sir Philip and by Junius respectively were as 22.96 to 14.29, or differed about as 3 to 2 (more correctly by 35 p. c.) the ratios of the average length of the word to the average height of the 'r' in 36 specimens written by Sir Philip agreed within 1 p. c. with the same ratio deduced from the same number of words written by Junius.

More recently where five specimens of the same word of known, and twenty-four of unknown authorship were com-

pared; though the greatest discrepancies existed in actual sizes of the separate words, the ratios of the heights of certain letters to the lengths of the respective words, calculated from their averages, differed by less than 0.02 p. c. proving without doubt that known and unknown writings were by the same hand.

From a number of experiments, not sufficient however to establish moduli of rapidity for all writers, it has been found that the pen point moves 17 mm. per second in the slowest, and 60 mm. in the fastest writing timed. Illiterate and phenomenal writers would extend the limits downward and upward respectively. As a result of this, the occurrence of gaps in a line of writing becomes an extremely important and delicate test of identity of authorship.

Dr. August Diehl, of Heidelberg, in a treatise on the writing of the healthy, gives tables in which are recorded the lengths of path traversed by the pen in writing the same word on successive trials, and the rapidity of the pen in millimeters to hundredths of a second. He experimented with three writers first writing slowly and carefully, and later fast and without care, on different days and under varying conditions.

His results show that in making a single numeral '8' the path of the pen varied from 11.61 mm. to 13.8 mm., and the rapidity of writing varied from 28.17 mm. per second by the fastest writer of these three persons to 18.76 mm. per second by the slowest.

The persons upon whom he experimented were four male and four female assistants in the university clinic for the insane at Heidelberg.

Tremograms are the curious marginal irregularities which accompany, and seem to a certain degree to characterize, the handwritings of each writer. In studying those of different individuals it will be observed that these irregularities differ: (1) in general appearance; (2) in the margin of the ink line on which the greater number of them occur; (3) in the frequency with which lines joining the apexes of the angles on the two margins oscillate up and down from horizontality in a given length of ink line.

All highly magnified traced lines show irregularities of margin due partly to imperfections in the tracing instrument, partly to unevennesses of the surface receiving the marks, and partly to agitations which are never entirely absent from objects on the earth's surface, especially in populous places. But these irregularities are of a different order and are different in conformation from those which always accompany the writing by a human hand, and which remain the most striking of all after the others have been put out of consideration.

The absence of tremograms in a machine-ruled line when it is compared with one traced by a pen in the hand becomes most evident.

To sum up, the reasons on which the scientific study of handwriting are based, are as follows:

HANDWRITING.

(1) The concrete result of forces acting simultaneously to produce a body represents its individuality.

(2) The above is as applicable to the construction of an animal or plant as of handwriting, though in the first case only physical forces are employed, while in the latter both physical and psychical forces are involved.

If the above premises be granted, then the principle of measurement for identification should be as applicable to handwriting as to human beings.

This kind of study of handwriting, including that of the agents necessary to its production has been called Bibliotics, which has been divided into Grammapheny, or the study of those characteristics which distinguished each separate handwriting, and Plassopheny or the means of detecting forgery.

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HANDY, a. *hăn'dĭ* [Dan. *haendig*, handy: Goth. *handugs*, clever, wise: Norw. *hendt*, adapted]: ready; able to use the hands with ease and skill; dexterous; convenient; near. HAN'DILY, ad. *-dĭ-lĭ*, in a handy manner. HAN'DINESS, n. HANDIWORK, n. *hăn'dĭ-wĕrk* work done by the hands; workmanship.—SYN. of 'handy': skilful; adroit; near.

HANDY-DANDY, n. *hăn'dĭ-dăn'dĭ* [a word expressive of shifting and changing (see HAND and DANDLE)]: in *children's play*, a changing of hands and places: the changing of an article from hand to hand rapidly, and the guessing in which hand it ultimately rests.

HAN'FORD, Cal., city and county-seat of Kings County; on the Southern Pac. and Santa Fe R.R 's, about 30 miles southeast of Fresno, and 250 miles south of San Francisco. It was first settled in 1871 and was made a city in 1891. Its chief industries are agriculture, fruits, raisins, and livestock. It has also flour and planing mills, milk condensing factory, butter and cheese factories, etc., and is a distributing centre for food products and clothing sent to the mining sections in vicinity. The city government is by a Board of Trustees, the board choosing its own chairman. The city has six banks, and a Carnegie Library. Pop. (1910) 4,829.

HANG, v. *hăng* [Icel. *hanga;* AS. *hon*, to hang]: to suspend; to be suspended; to fasten to something above in such a way as to be movable; to put to death by suspending by the neck; to be supported by something raised above the ground; to dangle; to depend; to cling to; to linger. HANG'ING, imp.: ADJ. dangling; swinging: N. death by a halter (see HANGING, below). HANG'INGS, n. plu. drapery hung against the walls or at the windows of rooms for ornament; figured paper linings for rooms. HUNG, pt. and pp. *hŭng*, did hang; also HANGED, pt. and pp. *hăngd.* HANG'ER, n. that on which anything is hung; a short broadsword. HANGER-ON, a dependant. HANG'MAN, n. the public executioner. To HANG OUT, to display. To HANG OVER, to hover or impend; to project. To HANG UP, to suspend; to suffer to remain undecided. To HANG FIRE, in *mil.*, to be slow in communicating fire through the vent to the charge, as in a gun; to be slow in taking effect. To HANG TOGETHER, to be closely united. HANGED, DRAWN, AND QUARTERED, the description of the capital

sentence on a traitor, which consisted of drawing him on a hurdle to the place of execution, and after hanging him, dividing his body into quarters. This punishment was substituted by the stat. 54 GEO. III. c. 146, for the ancient still more barbarous sentence of disembowelling alive, but the crown has power to reduce the sentence to simple beheading: see HANGING.

HANG-CHOW-FOO, *hâng-chow-fô′:* capital of the province of Che-keang, China, on the left bank of the Tsien-tang, where that river disembogues into the bay of Hang-chow foo. It is at the commencement of the Grand Canal, lat. 30° 18′ n., long. 120° 15′ e.; about 150 m. s.e. of Nankin and 110 m. s.w. of Shanghai, on the left bank of Tsien-tang. Pop. about 700,000. Hang-chow-foo is the most magnificent city of China—a Chinese proverb makes it a heaven upon earth. It was the capital of the empire during the rule of the Mongols, when it was visited by the celebrated Marco Polo early in the 14th c. There are ten gates through its lofty walls, which are 20 m. in circumference, but there are more inhabitants without the *enceinte* than within. The streets, wider than is usual in Chinese cities, are well paved, and in some directions lined for miles with elegant shops and extensive warehouses. The terminal ramifications of the Grand Canal are spanned by countless elegant bridges. Hang-chow-foo, is celebrated for its silk manufactures, and its embroidery excels that of any part of China, Mulberry-trees occupy every vacant spot within and without the walls. No city in China, unless it be Suchau, possesses wealth to compare with that of this remarkable place, which, moreover, is the most literary and most religious part of the empire. Colleges and temples, *literati* and priests, abound and flourish in Hang-chow-foo. The imperial library in the palace of Kienlung, and the literary institutions, appear, however, to be going to decay, and could not at any period have had much educational influence. One cause of the celebrity of the city is found in the beauty of its environs. The tower of the Thundering Winds, though in ruins, is still an imposing edifice; while monumental gateways, light airy bridges, and temples of the size of villages, render the natural beauties of the city highly picturesque. One of the temples possesses 500 images of the Io-han (Buddhist saints), of the size of life, richly covered with gold. Nothing can exceed the beauty of the valleys opening into the lake, richly adorned as they are with trees, chiefly the camphor and tallow trees, and the arbor vitæ. From a remote period, these scenes have been the resort of pilgrims, and every spot is hallowed by some legendary incident. At one place there is an image of Buddha, cut out of the solid rock, measuring 48 ft. from shoulder to shoulder. The nose is seven ft. long, and the other parts are of proportional size; it is gilt over like wooden and clay images of the same personage. The protruding rocks around are profusely carved with religious inscriptions and images of

mythological characters. The n.e. section of Hang-choo-foo is called the Tartar city, being exclusively devoted to the Mantchu garrison or military colony. It is separated from the Chinese city by a low wall. About 25 m. below the city is Kanpoo, once a mart of considerable importance, the port of Hang-choo-foo, when that city was the metropolis of China, described by Marco Polo as an extremely flourishing place; fluvial changes have rendered it inaccessible to any but small flat bottomed vessels, Chapoo, about 50 m. distant, on the n. of the bay, is now the port of Hang-chow-foo. Chapoo has also a Tartar city; it communicates by branches of the Grand Canal with Hang-chow-foo and Shanghai. It is the port to which Chinese trade with Japan is restricted. Hang-chow-foo suffered considerably at the hands of the rebel Taepings (q.v.) by whom it was captured. There is a Rom. Cath. mission at Hang-chow-foo and there are mission stations of the American Baptists and Presbyterians, and of the English Church Missionary Society.

HANG'ING: mode of capital punishment. In England, formerly, in atrocious cases it was usual for the court to direct the murderer to be hung upon a gibbet in chains near the place where the crime was committed: later the custom was to order the body to be dissected—and the execution to take place the next day but one after the sentence was passed. But these useless severities were abolished by the stat. 6. and 7 Will IV. c. 30.

The mode of punishing by hanging was adopted in England 1241, when Maurice, a nobleman's son, was hanged for piracy. Other more barbarous modes of inflicting death were long in use, being prescribed by statute, but have been abolished, and hanging has long been the ordinary, because deemed the most humane, mode of capital punishment. In treason hanging is part of the statutory punishment, coupled with mangling the body, though the crown may change the sentence into simple beheading, except in the case of women, who are only hanged, in deference to their sex.

In the United States beheading is not a mode of punishment: hanging has been and is the only mode of execution under civil law, except that in N. Y. a law went into effect 1889, Jan. 1, requiring all executions of capital sentences to be by electricity. See EXECUTION.

The cause of death in hanging is complex. The compression of the windpipe by the cord, the obstruction of the return of venous blood from the head, and of the flow of arterial blood to the brain, the stretching or tearing of the nervous structures of the neck, and in some instances dislocation or fracture of the vertebræ, may concur in the production of the fatal effect, which, though attended with violent struggles in some cases, probably supervenes very speedily.

HANG'ING GAR'DENS of Babylon: anciently reckoned among the wonders of the world. Their construction is variously ascribed to Queen Semiramis, and to Nebu-

chadnezzar— seven centuries later, but still more than five centuries B.C. Nebuchadnezzar is said to have made them for the gratification of his Median queen, Amytis, because the Babylonian plain seemed dreary to her in comparison with the varied and romantic scenery of her native land. Dodorus and Strabo have given particular descriptions of them; and though it is remarkable that they are not mentioned by Herodotus, while Quintus speaks of them as 'fabulous wonders of the Greeks'—an opinion which some of the learned in modern times have adopted, denying their very existence—yet the probability seems in favor of the general accuracy of the descriptions, and even that the ruins of this celebrated structure are to be recognized among the mounds which mark the site of Babylon: see BABYLON. The hanging gardens are said to have formed a square, with an area of nearly four acres; but rising in terraces curiously constructed with stone pillars, across which were placed stones, covered with reeds and bitumen, and again with bricks united by cement; above these sheets of lead, to prevent moisture from flowing down, and finally a sufficient layer of earth; the summit being elevated 300 ft. above the base, so that at a distance the whole presented the appearance of a pyramidal wooded hill. There was a large reservoir at the summit filled with water by pumping from the Euphrates, for the irrigation of the gardens, and the supply of their numerous fountains. Fountains and banqueting rooms were distributed throughout the numerous terraces; groves and avenues of trees, as well as parterres of flowers, diversified the scene; while the view of the city and neighborhood was extensive and magnificent.

HANK, n. *hăngk* [Ger. *henken*, to fasten something upon another: Norw. *haank*, a cluster: Icel. *hangr*, a hank or coil; *haunk*, a wreath of thread wound round a reel]: *literally*, a loose ring or coil for hanging things up by; a parcel or thread consisting of two or more skeins tied together; a coil of thread; in ships, a wooden ring fixed to a stay; in *N. of Eng.*, a withy or rope for fastening a gate.

HANKER (AFTER), v. *hăng'kẽr* [Dut. *hungkeren*, to seek eagerly: Flem. *hungkeren*, to hinny]: to long for with eagerness. HAN'KERING, imp.: ADJ. longing for with ardent desire: N. an ardent or vehement desire to possess or enjoy. HAN'KERED, pp. *-kẽrd*.

HANKOW, *hân-kow'* (mouth of the Han): port of China, at the junction of the Han river with the Yang-tze-kiang, 600 m. from its mouth; lat. abt. 30° 30′ n., and long. 114° east. It consists of three cities, the principal being Wu-chang-foo, on one side of the Han river, and Han-yang-foo on the opposite side. Strictly speaking Hankow is a suburb of the former. It was destroyed during the Tae-ping rebellion, but has since been rebuilt. English and American steamers ply regularly and frequently between Hankow and Shanghai. Vessels of large size can reach the

city, the river is navigable 360 m. higher up, to the city of Ichang. Powerful flat-bottomed steamers are requisite for navigating this part of the Yang-tze-kiang, the current running at from seven to eight knots per hour. The principal export is tea. Other native products exported are silk, oil, tallow, tobacco, and wax. The chief imports are cotton piece-goods, woolens, metals, Straits and Japanese produce. The quantity of tea annually exported averages nearly 119,000,000 pounds, and the average aggregate value of the coal trade of the port annually is over $60,000,000. Over 1150 steamers clear the port annually, carrying cargo of about 1,050,000 tons. The port was opened to foreign trade by the Treaty of Tientsin, ratified in 1860; and soon became the chief emporium for the tea trade of the central provinces. A concession of about 90 acres of land apart from Chinese jurisdiction is laid out like an English town. The residents of the British concession are formed into a municipality, with a council empowered to levy taxes. Pop. 850,000.

HANLEY, *hăn'lĭ:* town of Staffordshire, England, in the district known as *The Potteries*, and included in the parliamentary borough of Stoke-upon-Trent (q.v.). It is two miles and a half from Newcastle-under-Lyme, about one mile from Stoke, and one mile from the North Staffordshire railway station and canal offices. The principal portion of the town has an elevated site. The streets are not very regular, but they are wide and well paved; and many of the houses are well built. There are several commodious market-places. There are numerous places of worship of the Church of England and other denominations. Among the public institutions is an infirmary. Contiguous to Hanley is SHELTON, which may be regarded as forming with it one town. The manufacture of earthenware and china is the principal employment of the inhabitants of both. At Shelton is a villa called Etruria, erected by Josiah Wedgwood, remarkable for the Etruscan vases with which it is ornamented, imitations of ancient vases found in Italy, and the study of which was of great use to him in his endeavors to improve the manufacture of earthenware. Pop. 61,500.

HANNA, MARCUS ALONZO: American legislator; 1837, Sep. 24,—1904, Feb. 15; b. New Lisbon, Ohio. His parents moved in 1852 to Cleveland where he received a public school education followed by a year's course of study in Western Reserve Univ. With his father, he engaged in the wholesale grocery business and afterward in the iron and coal trades; was long identified with the lake carrying industry, being interested in vessels plying on the lakes and also in the construction of such vessels; was president of the Union National bank of Cleveland, and of the Cleveland City Railway company; director of the Union Pacific Railway company; delegate to the National Republican conventions of 1884, 1888 and 1896; became chairman of the National Republican committee in 1896, which secured the election of President McKinley; and was

elected U. S. Senator from Ohio, 1897. In the Senate he was a member of the Committee on Naval Affairs, Mines and Mining, Interoceanic Canals, Enrolled Bills, Commerce, and chairman of committee on Relations with Canada. He took an active part in the organization of the National Civic Federation for arbitration between labor and capital, and became its president in 1901.

HAN'NAY, James, Canadian historian and journalist: b. Richibucto, N. B., 1842, Apr. 22. After many years of editorial work upon influential Canadian journals, he was chief editorial writer on the Brooklyn, N. Y., *Daily Eagle* (1885–7), and editor of the St. John, N. B., *Daily Gazette* (1888–92), and St. John *Daily Telegraph* (1892–1900). Since 1902 he has been official reporter of the New Brunswick Provincial Parliament. Besides reports of the New Brunswick Supreme Court, he has published *Nine Years a Captive* (1875); *History of Acadia* (1879); *The History of the Loyalists* (1893); *The Story of the Queen's Rangers in the American Revolution* (1883); *Life and Times of Sir Leonard Tilley* (q.v.) (1897); *The History of the War of* 1812; *New Brunswick: its Resources and Advantages* (1902).

HANNIBAL, *hăn'ĭ-bal:* city in Marion co., Mo.; on the Miss. river; and on the Missouri, K. & T., the Chicago, B. & Q., the Wabash, and the Saint Louis, K. & N. W. R.R.'s; about 90 miles northwest of St. Louis and 15 miles south of Quincy, Ill. Hannibal was settled in 1819 and incorporated in 1839. It is situated in an agricultural region. The chief manufactures are foundry and machine-shop products, flour, lumber, cigars, lime, cement, stoves, car-wheels, shoes, and furniture. It is an important trade centre, as it has the advantages of several railroads and steamboat connection with the cities and towns on the Mississippi. A steel bridge for railroad cars and wagons crosses the river from Hannibal to East Hannibal, Ill. The trade is principally in tobacco, lumber, flour, potatoes, ready-made clothing, dairy products, and the city manufactures. It has a free circulating library, public and parish high schools, the Douglas colored high school, and a number of fine public buildings. The city charter of 1845, revised in 1873, provides for the annual election, by the people, of a mayor and a certain number of the members of the school board. The officials of the administrative departments are under the control of the mayor. The electric light plant is owned and controlled by the city. Pop. (1910) 18,341.

HANNIBAL, *hăn'ĭ-bal (the favor of Baal)*; hero of the second Punic war; b. B.C. 247; said by Livy to have died B.C. 183; famous son of Hamilcar Barca. He was the greatest of all that bore the name of Hannibal, common among the Carthaginians, and numbering 14 or 15 famed in history. When he was nine years old, he accompanied his father on his Spanish expedition; and before starting, swore that oath of eternal hatred to the Roman name,

which he kept faithfully throughout his life. After the death of Hamilcar, he was employed by Hasdrubal, his brother-in-law, in most of the military operations which he undertook. Such was the esteem in which he was held by the soldiers, and such a reputation for bravery and strategic skill had he gained, that when Hasdrubal was assassinated, the army with one voice elected him commander-in-chief, an appointment which the authorities at Carthage at once ratified. Hannibal, at this time in his 29th year, undertook the command with ready zeal, for he longed to realize the legacy left him by his father, and to strike a death-blow at his country's rival by attacking her on her own soil. But before he entered on a task of such magnitude, he deemed it prudent to complete the subjugation of Spain, and accordingly spent two years in contests with some tribes hitherto independent of Carthage. Saguntum, a city in alliance with Rome, was attacked by him on the ground that its inhabitants were making aggressions on the Torboletes, subjects of Carthage. After a siege of eight months the city was taken; and the Romans, after an embassy had unsuccessfully demanded the surrender of the general who had thus wantonly violated the treaty, declared war B.C. 218. Having taken measures for the defense of Africa and Spain, during his absence, he started from New Carthage B.C. 218 with 90,000 foot, 12,000 horse, and 37 elephants. This force was very much thinned by his contests with the tribes between the Iberus and the Pyrenees, by the necessity of leaving Hanno with 11,000 men to keep them in subjection by desertion in the passage of the Pyrenees, and by his sending home a portion of his Spanish troops. His object in this last act was to inspire the soldiers with thorough confidence in themselves and their general. From the Pyrenees he marched to the Rhone, without opposition, since Scipio was at Massilia (Marseille), four days' march from the point where Hannibal crossed the river in the face of the Celtic hordes who sided with the Romans. His next great difficulty was the passage of the Alps, which he effected in 15 days, in spite of the attacks of the mountain tribes, the snows, storms, and other difficulties. Much discussion has taken place among learned men whether Hannibal crossed the Cottian Alps by the pass of Mont Genevre (or Cenis), or the Graian Alps by the pass of Little St. Bernard. For the former route, Michalet, Thierry, and most French writers argue; and for the latter, with better reasons, Niebuhr, Arnold, Mommsen, etc. After allowing his army (now about 26,000 strong) some time to recruit in the rich villages of the friendly Insubrians, he first subdued the Taurini, a tribe hostile to the Insubrians, and took their chief city after a siege of three days; and thus forced into alliance with him all the Ligurian and Celtic tribes on the upper course of the Po. Scipio, having returned from Massilia, took the command of the army in n. Italy, and met Hannibal first on the plain near the river Ticinus. The Romans were entirely routed; and Scipio, severely wound-

ed, retreated across the Po. The armies again met at the Trebia, with a like result, though the Romans, who had received reinforcements, were much more numerous. These battles were in B. C. 218. Having wintered in the neighborhood of the Po, and levied additional troops among the Gauls, most of whom were now his friends, Hannibal started southward as soon as spring permitted, marching through Liguria and the swamps of the Arno. In this difficult route, immense numbers of his beasts of burden and horses perished, and he himself lost the sight of one eye. He next inflicted a severe defeat, near Lake Thrasymene, on the consul Flaminius: thousands of Romans, including the consul, perished by the sword, and thousands in the lake, while 15,000 were taken captive, Hannibal losing only 1,500. After this victory, he crossed the Apennines to Picenum and Apulia, and thence recrossed to the fertile Campania, which he ravaged. Thither Fabius was sent with an army to oppose him, but no general engagement took place, the consul endeavoring to lead Hannibal into snares, which he succeeded in doing; but the wily African extricated his army by a stratagem, and returned to Apulia. He wintered at Cannæ, and B.C. 216, June 2, or, according to others, Aug. 2, he almost annihilated a Roman army of 90,000 men under Terentius Varro and Æmilius Paulus, in a battle a little below the town. About 50,000 are said to have fallen, including Æmilius Paulus, and a host of Roman knights, senators, and other distinguished persons. Here Hannibal committed, perhaps, the great military error of his life, in not marching direct to Rome; but it is supposed that he refrained to allow the tribes of Italy to declare in his favor. Many in s. Italy did attach themselves to his interests, but not in such numbers as he had anticipated. After some delay, he marched on Neapolis (Naples), which he did not succeed in taking, but the gates of Capua were opened to him, and here he wintered. The enervating effect which the luxury of Capua is said to have had on his army has been greatly overdrawn, but his residence there forms, in one point of view, the turning-point in the war, which from this time on became more desultory. Hannibal's great purpose was to arm the Italian nations against Rome, and so to crush her power by means of her own subjects; the Romans on the contrary, under the command of Fabius, Maximus (see FABIUS CUNCTATOR), henceforth avoided coming to a pitched battle with the Carthaginians, but sought rather to keep the tribes in awe, and harass Hannibal and his lieutenants by small armies in different parts of the country. Hannibal traversed Italy in all directions, surprised the Roman generals, defeated their armies, captured their towns, such as Casilinum, Arpi Tarentum, Metapontum, Thurii, Locri, and many others; at one time he even encamped only three miles from Rome. He defeated Centenius near Capua; Cneius Fulvius at Herdonea; Fulvius Flaccus on the Anio; Crispinus and Marcellus in Lucania; and the besieging army before Locri: in all these

cases the armies were almost annihilated. The defeat of Hasdrubal, his brother, with the loss of his army at the river Metaurus, practically decided the second Punic war, and was one of the decisive battles of the world: it compelled Hannibal to confine himself to the mountainous peninsula of Brutium, where for four years on the defensive, he resisted all the efforts of the Romans to dislodge him. At length, after having maintained himself in Italy more than 15 years, he was recalled to Africa, to defend his country against Scipio, who had 'carried the war into Africa', but notwithstanding his utmost exertions, and the bravery of his veteran troops, he was defeated by Scipio, near Zama, with a loss of 20,000 men. Peace was concluded in the following year, B.C. 201.

Hannibal's darling scheme had in the meantime been baffled, but his hatred to Rome was not diminished; accordingly; he set himself with all his zeal to make preparations for a still more deadly struggle at some future day. He turned his attention, in the first place, to political reforms, and some constitutional changes loudly called for, by which he placed the finances on a better footing. But his enemies accused him to the Romans of stirring up Antiochus III. of Syria to make war on them; and when ambassadors came to Carthage, Hannibal fled to the court of Antiochus at Ephesus. In the war which followed, he took no conspicuous part, but the king bitterly regretted afterward that he did not take the advice of Hannibal to carry the war into Italy. When peace was concluded, the surrender of Hannibal was one of the conditions; but foreseeing such a result he fled to Prusias, King of Bithynia, for whom he gained a naval victory over Eumenes King of Pergamus. He was at length demanded by the Romans; and seeing no hope of escape, he committed suicide by poison, which it is said he always carried with him in a ring for such an emergency.

Among ancient authorities, consult Polybius, Dion Cassius, Plutarch, and Appian; and of the moderns, Arnold, Niebuhr, Mommsen, Ihne, and the other historians of Rome. For military operations of this transcendent military genius, see Vaudoucourt *Histoire des Campagnes d'Annibal en Italie.*

HANNO, *hăn'nō:* probably a king of the Carthaginians (perhaps father or son of that Hamilcar who fell at Himera B.C.480): famed for his voyage of discovery along the W. coast of Africa, to found Libyo-Phœnician towns. His expedition is said to have consisted of sixty ships and 30,000 men and women. One city was built not far from the Strait of Gibraltar, and others along the coast reaching to Cape Bojador. He went S. as far probably as Sierra Leone. On his return to Carthage, he inscribed an account of his voyage on a tablet, and placed it in the temple of Kronos (Saturn), or, according to others, of Juno. It seems to have been written in the Punic language; the version of it which remains is only a Greek translation. The *Periplus*, the only detailed account extant of the voyage, has been published on the continent by Gelenius.

Boecler and Müller, and Berkel, and with an English translation by Falconer (Lond. 1797). Great discussions have taken place among the learned as to the *time* when Hanno's voyage was made (the best authorities favoring the period about B.C. 570; also as to *the* Hanno out of all the many Hannos of history; and as to the facts stated in the *Periplus*. Some recent writers find evidence in it of the existence of the *gorilla* in those ancient days.

HAN'NO (called the GREAT): one of many of that name, who was a Carthaginian leader, and the chief opponent at Carthage of Hamilcar and Hannibal. He was leader of the aristocratic party; and especially in the second Punic war favored peace with Rome.

HANOTAUX, ALBERT AUGUSTE GABRIEL, *âl-bâr ō-gûst gâ-brē-ĕl â-nō-tō*, French politician: b. 1853, Nov. 18 Beaurevoir Aisne. He chose for himself the profession of the law, took a scientific course in the Ecole des Chartes, and afterward became a teacher in the Ecole des Hautes Etudes. In 1879 he received an appointment in the French foreign office; in 1881 became a member of the cabinet, and was sent to Constantinople as ambassador in 1885. From 1886 to 1889 he was republican deputy; and in 1894 May received a portfolio in the second Dupuy cabinet. He has published: *Les Villes Retrouvées* (1880); *Origines de l'Institution des Intendants des Provinces* (1884); *Henri Martin, Sa Vie, Ses Œuvres, Son Temps* (1885); *Etudes Historiques sur le XVIe. et le XVIIe. Siècle en France* (1886); *Histoire du Cardinal de Richelieu* (1893); *L'energie française; Le choix d'une Carrière; La Paix Latine; Histoire de la France contemporaine; etc.*

HANOVER, N. H., town in Grafton County; on the Connecticut River, and on the Boston & M. railroad, about 72 miles northwest of Concord. It is situated in an agricultural region and its industries are connected chiefly with farm products and lumbering. It is a summer resort, but is known principally as a college town, being the seat of Dartmouth College. It contains also the Mary Hitchcock Memorial Hospital. Pop. 1,900.

HANOVER, Pa., borough in York County; on the Western Maryland and the Pennsylvania R.R.'s; about 32 miles south of Harrisburg. It was settled about 1729 and incorporated in 1813. It is in a rich agricultural section of the State, and nearby are iron-ore mines. The chief manufactures are shoes, machine-shop products, cigars, carriages and wagons, gloves and leather. Hanover is the commercial centre of a considerable part of York county; the trade is largely in agricultural and dairy products, the manufactures of the borough, and in live stock. The government is vested in a burgess and borough council. Pop. (1910) 7,057.

HAN'OVER (Ger. *Hannover, hân-nō'vĕr*): formerly an independent kingdom of n. Germany, but since 1866 a province of Prussia. (On some points in this article relative to the period before the incorporation with Prussia, see

for the recent period, PRUSSIA, KINGDOM OF GERMANY.) Hanover extends from 51° 18′ to 53° 52′ n. lat., and from 6° 43′ to 11° 35′ e. long. It may be divided into three districts, viz.—1. The eastern, which consists of the duchy of Bremen com Hadeln, a section of the duchy of Lauenburg, the duchy of Werden, the principalities of Lüneburg, Kalenberg, and Hildesheim, and the countships of Hoya and Diepholz; 2. The western (separated from the former by the duchy of Aldenburg) comprising the duchy of Aremberg-Meppen, the principalities of Osnabrück and East Friesland with the Harlingerlands, the lower countships of Lingen and Bentheim, and the circle of Emsbühren, which formerly belonged to the see of Münster; 3. The southern separated from the other Hanoverian territories by Brunswick, and comprising the principalities of Grubenhagen and Göttingen, with the districts of Elbingerode and Ilfeld. Hanover is bounded by the German Ocean and river Elbe, e. by Mecklenburg and Prussian Saxony, s. chiefly by Westphalia and Hesse Cassel, w. by Holland. Area of the Prussian province of Hanover, 14,800 sq. m.; pop. (1900) 2,590,939.

Physical Character, etc.—The general physical character of Hanover is that of an extended plain with slight undulations, but in the s. the country is mountainous, embracing a considerable part of the Harz, together with the lesser heights of the Eichsfeld, Sollinger. Süntel, Deister-Oster, and Hildesheimer-Wald. From the base of these hills to the sea-coast, the land is one vast plain, interrupted only at some points by low ranges of hilly ground. The mountains, which abound in minerals, are covered with dense woods, and the valleys between are fertile and well adapted to agriculture; but beyond these valleys the country is traversed e. to w. by a sandy tract 50 to 80 m. in width, known as the Lüneburg Heath in which the inhabitants with difficulty gain scanty subsistence by rearing sheep and keeping bees. Great marshes or peat-moors cover the n. and n. w. districts, but these have in some parts been so successfully drained that they yield good pasture, though the soil is generally unproductive, comprising some of the poorest districts of Germany. The principal rivers are the Elbe, which forms 120 m. of the n. e. boundary; the Weser, on whose affluent the Leine, Hanover, the cap. of Hanover is situated; the Aller, the Ems, and the Vechte, all falling into the German Ocean. There are numerous small lakes and several canals.

Products.—Agriculture is in a very backward condition. The richest corn-growing districts are Hildesheim, Göttingen, and Kalenberg, and the marsh lands near the Elbe and the Weser; rye is grown for bread, and largely used by the rural population. The turf from the peat-moors in the n. and n. w. districts is the only fuel in some parts of the country. Cattle, horses, and geese are extensively raised in e. Friesland and the marsh-lands; and barley and oats are raised in sufficient quantity for exportation. The Lüneburg and other extensive heaths af-

ford good sheep-walks. In e. Friesland, large flocks of geese are reared, the flesh of which is salted and exported; and large quantities of butter and cheese are annually exported from the same localities. The forests on the Harz Mountains and their offshoots yield much wood, chiefly pine and oak, while the valleys grow tobacco and some good fruits. The mineral resources of Hanover are rich and varied, including iron, copper, silver, lead, sulphur, zinc, coal, cobalt, vitriol, alum, arsenic, lime, gypsum, marble, pipe-clay, kaolin, freestone, slate for tiles, salt, etc.

Commerce, etc.—The trade, which has had some augmentation since Hanover joined the German Zollverein (q.v.) 1854, has developed and grown in importance owing to numerous favorable conditions presented by the navigable rivers of the Hanoverian States, their good ports, well-kept high-roads and extended railways. Besides mining, agriculture, and the rearing of cattle and other animals, the chief branches of industry are sugar-refineries, and the manufacture of tobacco, paper, hemp, thread, and linen, leather, bricks, pipes, etc.

The exports consist mainly of mineral products, coarse linens and canvas, honey and wax, feathers, wood, wool, horses, cattle, wheat and rye, butter, hops, rape and linseed, oil-cakes, hams and sausages. The imports comprise English manufactured goods, colonial products, wine and spirits, and silk. Emden is the principal trading port, but the chief sea-trade of the country is effected through Hamburg and Bremen, while Hanover has an extensive commission and transit business with Leipsic and Frankfurt-on-the-Maine.

Shipbuilding has become an important industry, and the provincial shipping trade is increasing the ownership of its vessels.

Religion, Education, etc.—Religious matters are under the direction of Lutheran (Evangelical) and Reformed consistories at Hanover, Stade, Otterndorf, Aurich, Hadeln; and under the see of Osnabrück, held alternately by a Rom. Cath, and a secular Prot. bishop; and the Rom. Cath. see of Hildesheim.—Hanover, like other countries of n. Germany, is amply provided with educational institutions. It has one University at Göttingen, high and lower gymnasia, normal and polytechnic schools, a military academy at Hanover, a 'Foundation Padægogium' at Hefeld, schools of surgery and midwifery, of which that at Celle is the most esteemed, schools for the blind, deaf and dumb; also about 3,600 free parish schools, in most cases dependent on the local church party, whether Prot. or Rom. Catholic. There are also several good mining and forest schools in different parts of the kingdom. Education is compulsory and free.

Constitution, Government.—Hanover was a sovereign kingdom 1814–66. The monarchy was hereditary in the male line, and the administration was conducted by a responsible ministry with two representative chambers, whose concurrence was essential to the exercise of certain

prerogatives of the crown. There were, morever, 7 provincial assemblies, whose concurrence and assent were necessary for the promulgation of laws and the levying of taxes within their several districts. The highest department of the govt. was the council of state. The cabinet which, after 1848, was composed of responsible members, comprised seven ministers, each presiding over a special dept. of the administration. The chambers were summoned every two years, but the diet or landtag was septennial. The monetary system, and the weights and measures of Hanover, were the same as those adopted by the German Zollverein (q.v.). For administrative purposes, the province is divided into the six districts of Hanover, Hildesheim, Lüneburg, Stade, Osnabrück and Aurich. The highest court is in Celle. The province sends 36 members to the Prussian Chamber of Deputies, 10 to the Upper House, and 19 to the German Reichstag.

History.—Hanover was long connected with the Brunswick family, a scion of which, Ernest Augustus, in 1692, became the first Elector of Hanover. He married the daughter of the Elector Palatine, granddaughter of James I., and niece of Charles I. of England. He was succeeded in 1698 by his son George Louis, who in accordance with the Act of Settlement became George I., king of England, at the death of Queen Anne in 1714. The connection with England continued during four reigns, and in 1814 the Congress of Vienna raised Hanover to the rank of a kingdom, George IV. and William IV. thus being kings of Great Britain and of Hanover. On the accession of Queen Victoria, however, by the Salic law, the Hanoverian crown passed to the nearest male heir, Ernest Augustus, Duke of Cumberland, and at his death in 1851 to his son George V. In 1866 Hanover sided with Austria in the Austro-Prussian contest; the capital was occupied by Prussian troops; the king lost his throne, his estates were sequestrated, and Hanover was annexed to the Prussian dominions.

HAN'OVER (Ger. *Hanno'ver*): formerly capital of the kingdom, now chief town of the province of Hanover; on a plain on both banks of the Leine—here crossed by ten bridges, and navigable hence to the ocean—about 100 m. s.s.w. of Hamburg. It consists of the old town, and the suburbs Glocksee and Linden; pop. with these inclusive about 235,700. The older parts of the city are mean and unattractive, but since 1837, when by accession of Ernest-Augustus, Duke of Cumberland, to the throne, it became the residence of the sovereign, Hanover has undergone extensive improvements. In the Waterloo Platz, with its column surmounted by a figure of Victory, are the fine new barracks and arsenal. Besides these, the most interesting buildings are the stately town-hall in the marketplace, founded 1439, with an adjacent public library of 40,000 vols.; royal library, with 170,000 vols. and 4,000 MSS. incunabula, archives, and valuable state papers; the theatre, one of the largest in Germany; the king's palace; the museum, with natural history collections; a gallery of

pictures, etc.; and the royal state palace, built on the site of a monastery of Minorites 1632, notable for the magnificence of its interior decorations, and for the number and value of the objects of ancient and modern art which it contains; its fine gallery of paintings; its chapel, in which are preserved numerous relics and antiques, many of which were brought from Palestine by Henry the Lion 1172; and an altar-piece by L. Cranach. Among charitable institutions are the orphan asylum, school for the blind, infirmaries, hospitals, and poor-houses, the latter supported principally by private subscription. Hanover is well provided with educational institutions, the most noteworthy of which are the Georgianum, a collegiate school for the sons of noblemen; a lyceum, and a gymnasium. The city has also polytechnic, normal, and medical schools, and numerous free public schools. Hanover was the first place in Germany lighted with gas (1826). The discovery of a rich bed of asphalt in the neighborhood has been the means of giving the streets better side-pavements than in most other German towns, while recent improvements in the old system of sewers, which dates from the 16th c., render the drainage particularly good. Hanover has gained pleasant walks and pleasure-grounds by the levelling and planting of the ramparts; while in the immediate vicinity of the town are the royal palaces of Herrenhausen and Montbrillant, whose beautiful grounds and gardens are freely opened to the public.

Since Hanover became a centre of the n. German railway system, its manufactures have greatly increased. Among the foremost are manufactures of cotton, wax-cloth, machinery, locomotives: also gold, silver, and bronze wares, chemicals, leather, and tobacco. The trade of the place also has rapidly developed of late years.

HANOVER COLLEGE, at Hanover, Ind.; founded in 1828, under the auspices of the Pres. Church, as Hanover Academy. It was chartered as a college in 1833. Women have been admitted since 1880. The regular departments are letters, arts, science, law, philosophy, and divinity; also a course for teachers. No charges are made for tuition. In 1906 the college reported 15 instructors, 140 students, and about 20,000 volumes in the library. The endowment fund is over $200,000 ,and the annual income is about $15,000.

HANOVER COURT HOUSE, Engagement near.—1862, May 21; Gen. McClellan had marched the army of the Potomac up the York peninsula to the banks of the Chickahominy, 7 to 12 m. distant from Richmond. On the 26th he heard that R. H. Anderson's Confederate brigade and Stuart's cavalry were near Fredericksburg, and that another body, Branch's brigade, was in the vicinity of Hanover Court House, 17 m. north of Richmond, to his right and rear. These bodies threatened his communications, and were in position to reinforce Jackson, in the Shenandoah valley, or to oppose McDowell, whose advance was then eight miles south of Fredericksburg. Gen Fitz-

John Porter was ordered to clear the enemy from these positions and destroy the bridges over the South Anna and Pamunkey rivers. Warren's small brigade had been already detailed to destroy the bridges, had destroyed all means of communication over the Pamunkey as far as Hanover Court House, and was then posted at Old Church. On the morning of the 27th Warren moved toward the court house on a road running parallel to the Pamunkey. Porter left New Bridge at 7 A.M. with Morell's division and Emory's cavalry brigade and, marching by way of Mechanicsville northward toward the court-house, about noon his cavalry and the Twenty- fifth New York infantry, encountered a portion of Branch's brigade, supporting two pieces of artillery, attempting to hold the road leading to the court house. A Union battery was brought up and Butterfield's brigade deployed, which charged and drove the Confederates from the field, capturing one gun. A part of the Twenty-fifth New York was captured by the Confederates. Supposing that the Confederates had all retreated in the direction of Hanover Court House, Porter pursued the cavalry, under Emory, and the Seventeenth New York, overtaking and capturing a large number of the Twenty-eighth North Carolina. Upon nearing the junction of the Ashland and the Court House roads, a part of Martindale's brigade was sent toward Ashland to guard that flank against an approach from Richmond and to destroy the railroad running to that city. Near Peake's station Martindale ran into Branch's brigade, was immediately attacked, and was driven back some distance. When Porter, whose advance had reached Hanover Court House, heard that Martindale had been attacked, he faced about his entire column, reached Martindale, struck Branch on his left and rear, and routed him. Branch retreated to Ashland and formed a junction with Anderson's brigade, which had fallen back from McDowell's front. After destroying the railroad in several places and opening the way for McDowell's advance from Fredericksburg, Porter returned to his old camps on the night of the 29th. The Union loss in the engagement of the 27th, was 62 killed, 223 wounded, and 70 missing. The Confederate loss was 73 killed, 192 wounded, and 730 prisoners, of whom about 150 were also wounded. Consult: *Official Records*, vol. XI.; Webb, *The Peninsula; McClellan's Own Story;* Allan, *The Army of Northern Virginia*,

HANSEATIC, a. *hăn'sē-ăt'ĭk* [F. *hanse*, a corporation of merchants—from Icel. *handsal*, a contract: Goth. *handsa*. a band of men]: pertaining to the *Hanse towns*, certain towns in Germany, anciently associated for the protection of commerce. HAN'SARD, n. *-sȧrd*, a merchant of a Hanse town. HANSEATIC LEAGUE, of THE HANSA, *hân'sa:* famous confederacy of the Hanse towns in the middle ages; a union, first mercantile, later municipal also; established in the 13th c., by certain cities of n. Germany, for mutual safety and for protection of their trade, at that period exposed to the rapacity of rulers, and the lawless attacks of

marauders on land and pirates at sea. Notwithstanding obstacles such as these, and the heavy imposts levied on the German traders by their princes, several towns of n. Germany e.g., Hamburg, Lübeck, and Bremen, had acquired some commercial importance as early as the 11th c. The fame of the rich cargoes that found their way into their factories had given rise to swarms of pirates, who infested the mouths of the Elbe, and the outlets of the Baltic, and the necessity which the neighboring ports felt of protecting themselves effectually from such troublesome enemies, led, 1219, to the settlement of a compact between Hamburg, Ditmarsh and, Hadeln, to protect the course of the river and the adjacent sea. This agreement was followed two years later by a treaty of mutual aid and defense between Hamburg and Lübeck, which was joined, 1247, by the town of Brunswick. The progress of the League was so rapid, that, before 1260, when the first diet met at Lübeck, which was the central point of the whole association, it had its regularly organized government, with a fixed system of finance and administration.

The entire League which at one period numbered 85 towns, and included every city of importance between Holland and Livonia, was divided into four classes or circles: (1.) The vandal or Wendic cities of the Baltic; (2.) The towns of Westphalia, the Rhineland, and the Netherlands; (3.) Those of Saxony and Brandenburg; (4.) Those of Prussia and Livonia. The capitals of the respective circles were Lübeck, Cologne, Brunswick, and Danzig.

The cities composing the League were represented by deputies at the general diet, which met every three years, generally at Lübeck, which was considered the capital of the League, to discuss and settle the current business of the League; and they held an extraordinary meeting every ten years, to renew the various unions which constituted the great Hansa. The edicts of the diet were communicated to the masters of the great circles, who remitted them to the several guilds within their respective jurisdictions.

Four large foreign factories were established at London (1250), Bruges (1252), Novogorod (1272), and Bergen (1278); and besides these and the ordinary members, various cities were connected by treaties of limited alliance with the League; as, for instance, Amsterdam, Antwerp, Bordeaux, Barcelona, Cadiz, Dordrecht, Leghorn, Lisbon, Marseille, Messina, Naples, Ostend, Rotterdam, Rouen, Seville, St. Malo.

The Hanseatic League was the first systematic trade-union known in the history of the European nations, and the high political influence which it rapidly attained was due to its development of sounder principles of trade than any that had hitherto been put into practice; while in the earlier periods of its existence, it exerted a beneficial action on the advance of civilization, which can scarcely be overrated. Its professed object was to protect the commerce of its members by land and by sea, to defend and extend its commercial

relations with and among foreigners, and as far as possible to exclude all other competitors in trade, and firmly to maintain, and, if possible, extend all the rights and immunities that had been granted by various rulers to the corporation. For the promotion of these ends, the League kept ships and armed men in its pay, the charge of whose maintenance was defrayed by a regular system of taxation, and by the funds obtained by the money-fines which the diet levied for infringements of its laws For many years the Hanseatic League was the undisputed mistress of the Baltic and German Ocean. It created new centres of trade and civilization in various parts of n. Europe, and contributed to the expansion of agriculture and other industrial arts, by opening new channels of communication by means of the canals and roads with which it connected together the members of its association. The greatest powers dreaded its hostility and sought its alliance, and many of the powerful sovereigns of the middle ages were indebted to it for substantial benefits.

With the 15th c. the League reached at once its culminating point and its decline, for in proportion as the seas and roads were better protected by the states to which they belonged, and rulers learned to comprehend the commercial advantages of their dominions, both its necessity and its supremacy declined; while the discovery of America, and of a new sea-route to India, gave an entirely different direction to the trade of Europe. The Hansa had, moreover arrogated to itself, in the course of time, presumed rights of imposing the greater and lesser ban, and exercising acts of sovereignty and judicial power, incompatible with the supremacy of the rulers in whose states they were enforced; hence the League was necessarily brought into frequent collision with the local authorities. Thus, in accordance with their system of exclusive policy, the Hansards refused to grant to merchants trading in foreign parts the same privileges in the Hanseatic cities which they themselves had enjoyed for centuries in England, Russia and Scandinavia, and hence arose dissensions which frequently ended in a fierce maritime warfare. By way of retaliation for the pertinacity with which the League refused to grant to the English the same immunities which had been accorded to traders of other nations, parliament required that Germans should pay the tax on wool and wine, which was enacted from all other foreigners in the English markets; and though the Hansards strongly resisted, they were at length condemned by the courts, 1469, to pay a fine of £13,500; and they would probably have lost all they possessed in England, if their cause had not been advocated by Edward IV., who had more than once been indebted to them for money and aid, and who 1474 secured for them, by a clause in the treaty of Utrecht, a restitution of nearly all their former rights in England. In 1598, their obstinate pertinacity in insisting upon the maintenance of their old prerogatives, notwithstanding the altered condition of the times drew on

them the anger of Queen Elizabeth, who dispatched a fleet under Drake and Norris to seize the ships of the Hansa, of which 61 were captured, while she banished the Hansards from their factory in London. These measures had the desired effect of compelling the League to receive English traders on equal conditions ,and thenceforward the Hansards were permitted to occupy the steelyard, as in olden times. The Hansa had however,, outlived its date, and at the diet at Lübeck 1630, the majority of the cities formally renounced their alliance. Hamburg, Lübeck, Bremen, and, for a short time, Danzig, remained faithful to their ancient compact, and continued to form an association of free republics, that existed unchanged till 1810, when the first three were incorporated in the French Empire. These, in 1813, combined with Frankfurt-on-the-Main to form a union. Frankfurt became Prussian in 1866; whereas at a convention in July 1870, the powers and privileges of the three free towns were re-established and re-organized, and under the empire they retained their local self-government. See Sartorius, *Gesch. des hanseatischen Bundes* (1802–08); Barthold, *Gesch. der deutschen Hansa* (1854); *Hansische Geschichtsblätter* (1871–77).

HANSEL. See Handsel.

HANSE TOWNS. See under Hanseatic.

HANSEN, *hân'sĕn*, Gerhard Henric Armauer, Norwegian physician: b. Bergen, Norway, 1841. He was educated during boyhood in the cathedral schools of his native city, afterward entered upon the study of medicine, and was eventually appointed resident physician in the Rigs Hospital of Christiania. He was afterward government medical officer for the Lofoten fisheries, but did not reach the field of his fame until he was appointed in 1868 to the post of assistant physician at the Bergen Leper Hospital. From this time forth he devoted himself to the study of leprosy, and following the lines laid down by Virchow, traveled from one to another university of Europe continuing his investigations. On his return to Norway the Medical Society of Christiania voted a sum of money to pay the expenses of his further researches. He at last was enabled to demonstrate the fact that leprosy was contagious. Continuing his investigations he discovered at last the leprosy bacillus in unstained preparations. Later it was stained and became known as Hansen's bacillus (1873). He was not successful in employing the bacillus for purposes of inoculation with a preventive object; but on the basis of his contagion theory, legislation has been enabled to check to a considerable extent the spread of the disease.

HANSOM, n. *hăn'sŭm* [after the inventor]: a kind of cab or two-wheeled hackney-carriage, in which the driver has his seat behind the passenger instead of in front of him. See Carriage.

HAN'SON, Alexander Coutee, American journalist and politician: b. Maryland 1786; d. 1819. After being graduated at St. Johns College, Annapolis, he adopted journalism as a profession, and in 1812 his office was wrecked by a mob on account of an article attacking the Madison Administration which appeared in the *Federal Republican*, of which he was editor. He was elected to the lower house of Congress in 1813, and from 1817 until his death had a seat in the Senate.

HANSTEEN, *hân'stān*, Christopher: 1784, Sep. 26—1873, Apr. 15; b. Christiania, Norway: astronomer. At first intended for the legal profession, he turned to mathematical science. In 1814, he was appointed to the chair of mathematics in the Univ. of Christiania, and there, 1819, published his celebrated work on Magnetism, translated into German under the title *Untersuchungen über den Magnetismus der Erde:* it produced a great sensation, especially in England, so much so, that in almost all voyages of discovery since undertaken, magnetic observations have been made in conformity to his directions. In 1821, he discovered the 'law of magnetic force': see Magnetism. He journeyed to Siberia for magnetic observations 1828-30. Besides occupying his chair in the univ., Hansteen was prof. of mathematics in the School of Artillery, superintended the triangulation of Norway, and helped in the reorganization of the national system of weights and measures. He published lectures on astronomy, a work on mechanics, another on geometry, and several memoirs.

HANTLE, n. *hăn'tl* [corruption of *handful:* prov. Ger. *hampel*, a handful]: in *Scot.* and *OE.*, a handful; a considerable quantity; much; many.

HANUMÂN, or Haûnmân, *hăn'û-man* (nominative of the Sanskrit base *Hanumat* or *Hanumat*, literally meaning. 'having a jaw,' but understood to imply 'having a broken jaw'): a fabulous monkey, a deity playing a great rôle in the legendary history of the second or classical period of Hindu mythology. He is represented there as the strenuous friend and ally of Vishnu, when the latter, in his incarnation as Râma, made his expedition to Ceylon to recover his wife Sîtâ, carried off by the giant Râvana: see Vishnu. In the war between Râma and Râvana, Hanumân is related to have bridged over the ocean between the continent of India and Ceylon with rocks of a prodigious size, and to have performed many other amazing feats. These are related in the great poem *Râmâyana*, which gives history of Vishnu in his descent on earth as Râma, and, in many of its chapters, dwells, with particular predilection on Hanumân the monkey. Of his origin, the older version of this epos relates that his mother was an Apsaras or nymph, *Punjikasthalâ*, who, through some curse, was born as the daughter of a monkey, and under the name *Anjanâ*, became the wife of the monkey *Kesarin*. She transformed herself into a human shape, and, walking in splendid attire on a mountain-top, fascinated *Vâyu*, the god of wind, with

the result that the child Hanumân was born. When a child, Hanumân, lying on the lap of his mother, saw the sun rise, thought it a fruit, and started into the air to take it; but Indra, angry at his presumption, hurled him down with his fiery thunderbolt to the top of the mountain, where in his fall he broke his left jaw.

Hanumân is the type of the monkeys worshipped by a certain class of Hindus. The foundation of the myth is probably historical. There is no reason to doubt tradition when it tells us that a hero—it call him Râma—carried Brahmanic institutions from n. India to Ceylon, and we may believe it also when it connects this expedition with a war between the Brahmanic population of India and that of Ceylon. Nor is it improbable that Râma, on his march to the south, gained allies, who, on account of their barbarous condition, were compared by his followers to monkeys. With this, all that may be real in the myth of Hanumân seems to end; its other ingredients are either legendary or represent physical phenomena.

HANUS, Paul Henry, American educator: b. Hermsdorf-unter-dem-Kynast, Prussia, 1855, 14 Mar. He came to the United States in childhood, was educated at the University of Michigan and has been professor of the history and art of teaching at Harvard from 1891. He has published *Elements of Determinants* (1886); *Geometry in the Public School* (1893); *Contemporary Educational Problems* (1899); *A Modern School*; etc.

HANWAY, *hăn′wā*, Jonas: 1712-1786, Sep. 5; b. Portsmouth, England: philanthropist. In early life he was engaged in mercantile business in St. Petersburg, which necessitated an extensive journey in Persia, 1743-50; and on his return to England, he published *Historical Account of British Trade over the Caspian Sea, with a Journal of Travel*, 4 vols. (1753-4). He also published a *Journal of Eight days' Journey from Portsmouth to Kingston-upon-Thames* (1756), and nearly 100 pamphlets on a variety of philanthropic projects. He was one of the founders of the London Marine Educational Soc., and of the Magdalen Hospital; was instrumental in securing the passage of laws for the amelioration of various kinds of suffering; and was a liberal supporter of benevolent enterprises. He has a popular repute as the first Englishman who carried an umbrella in England. This he did amid the jeers and hootings of the populace.

HAN-YANG-FOO′. See Hankow.

HAP, n. *hăp* [Icel. *happ*, chance; *henda*, to seize, to happen: F. *happer*, to hap or catch]: that which we catch; that which falls to our lot; luck; chance; accident; fortune: V. in *OE.*, to come by chance; to happen. Hap′ping, imp. Happed, pp. *hăpt*. Hap′less, a. *-lĕs*, unlucky. Hap′ly, ad. *-lĭ*, by chance; casually. Haphaz′ard, n. *-hăz ērd* [*hap*, and *hazard*]: chance; accident. Happen, v. *hăp′n*, to come by chance; to fall out; to befall; to light upon; to occur. Happening, imp. *hăp′nĭng*. Happened, pp. *hăp′nd*.

HAP, v. *hăp* [a corruption of *lap* or *wrap:* Icel. *hiupr,* underclothing: Norw. *haufn,* a covering, a gown]: in *Scot.* and *OE.*, to cover for concealment, or for defense from cold; to wrap up warmly; to clothe: N. a covering of whatever kind; a warm covering. HAP'PING, imp. HAPPED, pp. *-hăpt.*

HAP'GOOD, ISABELLA FLORENCE, American author and translator: b. Boston, Mass., 1851, Nov. 21. She has written *The Epic Songs of Russia; Russian Rambles,* (1895); *A Survey of Russian Literature* (1902); *A Service Book of the Holy Orthodox Catholic (Greco-Russian) Church* (compiled and translated, 1905); etc. She has also translated from Russian: *Childhood Boyhood, Youth, Sevastopol, Life, What is to be Done?* by L. N. Tolstoy; *Dead Souls, St. John's Eve and Other Tales* by N. B. Gogol; *Orloff and His Wife* by Gorky; *The Novels and Stories of Ivan Targenelff* (16 vols , 1904); etc., and has also made many translations from French, Italian and Spanish.

HAPGOOD, NORMAN, American journalist: b. Chicago, 1868, Mar. 28. He was graduated from Harvard in 1890, and the Harvard Law School in 1893, and has since become well known as a keen, discriminating essayist and dramatic critic. He has published *Literary Statesmen and Others* (1897); *Daniel Webster* (1899); *Abraham Lincoln* (1899); *The Stage in America* (1901); etc. He was dramatic critic of the *New York Commercial Advertiser* and *Bookman* 1897-1902 and since 1903 has been editor of *Collier's Weekly.*

HAPLOMI. See ESOCIDÆ: MALACOPTERYGII: PIKE.

HAPPY, a. *hăp'pĭ* [from *hap* 1]: having good hap; possessed of or enjoying pleasure or good; fortunate; propitious; harmonious; agreeable; strikingly appropriate, as a speech. HAP'PILY, ad. *-lĭ,* fortunately; successfully; in a state of felicity; gracefully. HAP'PINESS, n. state in which the desires are satisfied; state of mind resulting from the enjoyment of good; felicity. HAPPY DISPATCH, in *Japan,* suicide under legal sanction, and as a mark of consideration to the sufferer, instead of a public execution; a voluntary death in this manner to avoid disgrace (see HARA-KIRI). HAPPY MAN BE HIS DOLE, in *OE.*, may his dole or share in life be that of the happy man.—SYN. of 'happily': fortunately; prosperously; luckily; successfully; gracefully; dexterously; felicitously;—of 'happiness': beatitude; 'blessedness': bliss; blessing.

HAPSBURG, *hăps'bĕrg,* Ger. *hâps'bûrch* (or HABSBURG), HOUSE OF: old German family which has given sovereigns to Germany, Spain, and Austria; of which the imperial family of Austria are the representatives. It derived its name from the castle of Habsburg, originally Habichtsburg (Hawk's Castle), on the right bank of the Aar, in the Swiss canton of Aargau. The castle was built in the 11th c. by Werner, Bp. of Strasburg, grandson of Gunthrun the Rich, Count of Alsace and Breisgau, who according to the Austrian chroniclers, was descended from

Ethico I., Duke of Alemannia and Alsace in the 7th c. Werner delivered the castle to his brother Kanzeline. whose nephew, Werner II., was the first who assumed the title Count of Hapsburg. Albrecht or Albert III., great-grandson of Werner II., assumed the title Landgraf of Upper Alsace, or Sundgau. This prince possessed a great part of Swabia, Alsace, and the Aargau, to which his son, Rudolf I., added Lauffenburg. On his death, 1232, his sons, Albert IV. and Rudolf II., divided their father's possessions —Rudolf becoming the founder of the Hapsburg-Lauffenburg line. This branch became extinct 1408 in Germany, but is still represented in England by the Fielding family. The whole possessions of Rudolf's lineage reverted to the Austrian line, 1415. Albert IV. laid the foundation of the future greatness of the House of Hapsburg. He left three sons, the eldest of whom, Rudolf III. (Rudolf I. of Austria)) succeeded him, and, by appropriating the provinces which, as emperor, he had wrested from Ottocar of Bohemia,—viz., Upper and Lower Austria, Styria, Carinthia, and Carniola,—greatly increased the power of his family. His son, Albrecht or Albert I. (q.v.), succeeded 1291 to the family possessions. The further history of the House of Hapsburg, may be traced in that of Austria (q.v.). It may be noted here that Ernest, surnamed the Iron, one of the sons of Leopold II., and founder of the Styrian line, married Cymburga daughter of Ziemovitz, Duke of Masovia (now province of Warsaw), and niece of Uladislas Jagellon, King of Poland, celebrated in Austrian history for her beauty, wit, and strength of body. From her are said to be derived the thick lips characteristic of the Austrian family. In 1881, the castle of Hapsburg was bought from the authorities of Aargau, and given as a wedding-gift by the Bohemians to the Crown Prince of Austria.—Compare Prince Lichnowski, *Geschichte des Hauses Habsburg* (1837), also Coxe's *House of Austria*.

HAPTICS, n. *hăp-tĭkz* [Gr. *haptein*, to touch]: The science which treats of the phenomena of touch. (See Optics, Acoustics). The name was suggested by Dessoir in 1892, and has come into general use. Haptics, treated as a branch of physiology and physiological psychology, covers the function of skin, muscles, joints, tendons, etc. A body of facts concerning the kinæsthetic senses has been discovered, and laws governing the relation between the stimulus and sensation formulated. (See Weber's Law.) All physiologies contain a chapter upon the subject of skin and muscle sensations, which gives some idea of the facts covered in haptics.

HAPUR, or Hapoor, or Haupur, *haw-pôr':* town of British India, in the N.W. Provinces, dist. of Meerut, 20 m. s. of the town of Meerut. There are 28 mosques and 25 temples. Government has a breeding-stud here, which has obtained celebrity for the character of the horses passed into the different branches of the service. Pop. 15,000, of which 9,000 are Hindus, 6,000 Mohammedans.

HARA-KIRI, *hâ'ra-kē'rē* (*Belly-cut*), also called **'Happy Dispatch'**: curious Japanese mode of official suicide, according to a system obsolete since 1868. The Japanese estimated the number of such suicides at 500 per annum. All military men, and persons holding civil offices under the government, were held bound, when they had committed any offense, to rip themselves up. This they performed by two gashes, in the form of a cross; but they might not do it until they had received permission from the court to that effect, otherwise their heirs would run the risk of being deprived of their place and property. Frequently at the death of superiors or masters, the same operation was self-inflicted by those who desired to exhibit devotion and attachment; sometimes also, in consequence of a disgrace or affront, it was resorted to when no other resource was left. Hara-Kiri severed the large artery in front of the spine, and thus brought easy death

HAR'ALD I., King of Norway. See HAROLD I., King of Norway.

HAR'ALD III., King of Norway. See HAROLD III., King of Norway.

HARAN, *hā'ran*, or CHARRAN, *kăr'an:* district in the n. of Mesopotamia, where Terah and Nahar, attracted by its extreme fertility, stopped after their migration from Ur of the Chaldees, while Abraham and Lot continued onward to Canaan.—Haran was the name also of an important strategic town 10 m. s.e. of Edessa (Orfa), on the bank of the Belik river, 50 m. n. of its junction with the Euphrates, at the point where the highways from Media, Assyria, and Babylonia meet to follow the same road to the Cilician coast. (See II Kings, xix. 12; Isa. xxxvii. 12). Its position gave it a large commercial importance (Ezek. xxvii. 23). In later days it was the scene of the defeat and death of Crassus by the Parthians B.C. 53, and of the murder of the Emperor Caracalla, at the instigation of Macrinus, A.D. 217; was the seat of the Haranite Sabeans, a heathen sect of the middle ages; retained its importance till the Arabs began to gain the ascendency; subsequently fell into decay and is now a mass of ruins.

HARANGUE, n. *hă-răng'* [F. *harangue*—from It. *arenga*, a ring, a public set speech; *arringare*, to place the audience in a ring for hearing, to make a set speech—from O.H.G. *hring*, an arena, a ring: comp. Gael. *aran*, discourse, dialogue]: *literally*, an address to a number of persons arranged in a ring; a popular oration; a public address; usually the word is contemptuous; v. to make a speech or to give an address to a large assembly. HARANG'UING, imp. HARANGUED, pp. *hă-răngd'*. HARANG'UER, n. *-ĕr*, one who.—SYN. of 'harangue, n.': a speech; address; oration; declamation; a ranting.

HARAR, *hâ-râr*, or HURRUR, *hô-rôr*, or ARARGE: city of e. Africa, in the country of the Gallas, about 220 m. s.w. of Berbera, which lies opposite to Aden, at the mouth of the Red Sea. The city, about 5,500 ft. above sea-level, is

on the slope of a hill. To the e. are plantations of bananas, citrons, limes, the coffee-tree, the khat—a theine plant well known in Arabia—wars or 'bastard saffron,' and sugar-cane. Westward are gardens and orchards on a terraced slope; northward is a hill covered with tombs; and to the south the land descends into a valley or ravine. It is about one m. long by half a m. broad. The streets and alleys are like mountain roads, strewed with rubbish and with heaps of rocks; and the abodes, built of sandstone and granite, cemented with a reddish clay, present a dingy appearance. Harar is surrounded by an irregular wall, pierced with five large gates, and defended by rudely-built oval turrets. The men are engaged in trade; while the women spin, weave, and cultivate the gardens. Morals are very lax, and the people are much addicted to intoxication with mead and Abyssinian beer. Harar is celebrated for sanctity, erudition, and fanaticism. The people are extremely bigoted, and hold all foreigners, particularly Christians, in hatred and contempt. Harar is the grand dépôt for the coffee, the wars-dye, the cotton, the gums, the tobacco, and the grain of the Galla country, the produce of which is conveyed to Berbera three times a year, in immense caravans. There is also an enormous slave-trade carried on. The imports are American cottons, shawls, silks, brass, copper, cutlery, dates, rice, sugar, gunpowder, and paper. Provisions are exceedingly cheap. Harar became Mohammedan 1521; was conquered by Egypt 1875, and given up again 1884. Burton, who spent ten days there 1855, disguised as an Arab, and at a great risk to himself, was the first European who reached the place. The Harari are a distinct people, with a language of their own, which some affirm to be Semitic (allied to Amharic), others to be only partially Semitic. Many of the inhabitants are Arabs, and many Somalis. Pop. variously estimated, 10,000 to 30,000.

HARASS, v. *hăr'ăs* [F. *harasser*, to tire or toil out, to vex—from the figure of setting on a dog: Norw. *hirra*, and *hissa*, to set on a dog]: to fatigue or weary to excess; to weary with importunity or care; in *mil.*, to inflict on an enemy trouble, annoyance, and injury by incessant petty attacks. HAR'ASSING, imp.: ADJ. fatiguing; teasing. HARASSED, pp. *hăr'ăst*. HAR'ASSER, n. *-sẽr*, one who.—SYN. of 'harass': to weary; jade; tire; fatigue; perplex; tease; distress; vex; molest; trouble; disturb.

HARAUCOURT, EDMOND, French poet and novelist: b. Bourmont (Haute-Marne) 1857. His first work appeared in 1883 and was entitled, *La légende des sexes poèms hysteriques*. A collection of his verses was published in 1891. He also published *Amis* (1887); *Shylock* (1889); *Don Juan* (1894); *Elizabeth* (1894). He was awarded the Academy prize for his poem *Les Vikings* (1890).

HARBAUGH, HENRY, American clergyman of the German Reformed Church in America: b. near Waynesborough, Pa., 1817, Oct. 24; d. Mercersburg, Pa., 1867,

Dec. 28. He studied at Franklin and Marshall College (Mercersburg) and at the Mercersburg Seminary, was ordained in 1843, and in 1843–64 held pastorates successively at Lewisburg, Lancaster, and Lebanon, Pa. In 1864 he was appointed professor of theology in the Mercersburg Seminary. He was one of the leading exponents of the Mercersburg theology, and belonged to the high-church school of his denomination. From 1850 to 1866 he was editor of the *Guardian*, and in 1866–7 of the Mercersburg *Review*. Besides a collection of poems in the Pennsylvania Dutch dialect, he published: *Heaven* (1843–53); a *Life of Michael Schlatter* (1857); *Christological Theology* (1864), and other works.

HARBEN, William Nathaniel: American novelist: b. Dalton, Ga., 1858, July 5. He has contributed many short stories to magazines, and his published novels include: *White Marie* (1891); *Almost Persuaded* (1890); *A Mute Confessor* (1891); *The Land of the Changing Sun* (1894); *From Clue to Climax* (1896); *The Caruthers Affair* (1898); *The North Walk Mystery* (1899); *The Woman Who Trusted* (1901); *Westerfelt* (1901); *Abner Daniel* (1902); *The Substitute* (1903); *The Georgians* (1904); *Pole Baker* (1905); etc. He is also the author of *Northern Georgia Sketches* (1900).

HARBIN, Manchuria, a city on the Sungari River at the point where the Manchurian branch of the Trans-Siberian railway crosses that stream. The Chinese eastern branch of the railway, running to Dalny (Talienwan) and Port Arthur begins here. Prior to the Russian occupation in 1900 (see Manchuria), Harbin was a small Chinese village. On account of its geographical and strategical position it was chosen as a military centre, and very quickly it became also headquarters for railway and governmental affairs. During the Russo-Japanese war (q.v.) of 1904–5 the city was occupied by Russian troops and used as a base of supplies. Commerce and manufacture have also greatly developed although not originally considered in the promotion of Harbin; and here more than elsewhere Russia gradually asserted its intention of becoming an active industrial force in the Orient. Every system of protection that could be devised has been employed by the government to advance its commercial prestige. Harbin consists of the old town, three m. distant from the central dépôt; Prestin, the river town, the present commercial portion; and the administration town, about the railway. Only Russians and Chinese are allowed to hold land, construct buildings, or enter any permanent enterprise. The territory for many miles surrounding has been secured so as to make it impossible for any foreign interest or influence to obtain a foothold or profit near to the city. The principal railway engineer is the chief administrative official. A census of 1903 showed a popu'ation of 60,000 exclusive of soldiery: of these all but 700 were Russians.

HARBINGER, *n.* *hâr'bĭn-jẽr* [OF. *herberger*, to harbor, to lodge: O.H.G. *hereberga*, a lodging, a harbor: AS.

heribyrigan; Scot. *herbery,* to give lodgment or quarters to]: *literally,* one sent forward to provide quarters for an army; one who looks out for lodging or a harbor for another; a forerunner; a precursor. HAR'BINGERED, a. *-jĕrd,* preceded by a harbinger.

HARBOR, n. *hâr'ber* [mid. L. *heribergum,* the duty of lodging officers on public service—from O.H.G. *heri,* AS. *here,* an army; and Ger, *bergen,* AS. *beorgan,* to shelter: Ger. *herberge;* It. *albergo;* OF. *herberge;* F. *auberge;* Icel. *herbergi,* a lodging, an inn, a harbor]: a place of rest, security, and retirement; a shelter; a port or haven for ships: V. to shelter; to secure; to secrete; to entertain, as bad thoughts, and revenge. HAR'BORING, imp. HAR'BORED, pp. *-bĕrd.* HAR'BORER, n. *-ber-er,* one who. HAR'BORAGE, n. *-āj,* shelter. HAR'BORLESS, a. shelterless. HARBOROUGH, n. *hâr'bŭr-ō,* in *OE.,* a lodging. HARBOR-MASTER, an officer who sees that all the harbor regulations are duly attended to.

HAR'BOR: inlet of the sea or other large body of water, so protected from the winds and waves, whether by natural conformation of the land, or by artificial means, as to form a haven for protection of vessels during storms or a port for commercial purposes. In selecting or constructing a harbor regard is also had to convenience in loading and unloading vessels. The two chief classes are harbors of refuge and commercial harbors. Often the latter are merely tidal, only to be entered by vessels as the tide serves, and where with the tide they rise and fall. Harbors of refuge or shelter are accessible in all conditions of tide. Sometimes there is a combination of the harbor or haven with a capacious protected roadsted outside of it, as at Cherbourg, France, and other places.

Construction.—In the construction of harbors the great desiderata are sufficient depth of water and perfect security for the vessels likely to frequent them, together with the greatest possible facilities for ingress during any weather, while the chief obstacles to be surmounted are the action of the waves upon the protecting piers and breakwaters, and the formation of sandbanks and bars, which diminish the depth of water at the entrance and also within. All good harbors should possess the following characteristics: A deep, broad entrance channel, which can be kept by ships of all kinds in all sorts of weather; an ample anchorage, free from rocks and shoals, with good holding ground, and protected from winds and waves. Commercial harbors should also be supplied with adequate constructions and appliances for loading and discharging vessels.

Ground-plan.—In designing the ground-plan of harbors, some rules should be kept in view: (1) the entrance should always be kept seawards of the works of masonry, care being taken that the direction of the piers does not throw the sea across the entrance; (2) there should be a good loose, or point of departure, free of rocks or a lee shore; (3) spending-beaches inside should be provided to allow the waves that pass in to break and spend themselves

(2) harbor basin surrounded with vertical quay-walls becomes a boiling pot), but this is a point frequently overlooked by engineers; (4) the relation of the width of entrance to the area of a harbor should be a matter of careful study, as upon this depends the tranquillity of the interior.

Anchorage.—The anchorage of a harbor should be large enough to afford shelter to the maximum number of vessels seeking it. The space required by a vessel at anchor is, roughly, a circle whose radius is six times the depth of water plus the vessel's length. First-class harbors should have a depth of at least 40 feet, to admit and give secure anchorage to the largest ships now existing. An available depth of 25 feet is sufficient for ordinary transatlantic freight and passenger steamers. Coasting vessels rarely have a draft of more than 20 feet.

Natural Harbors.—Some of the best known natural harbors are those of Queenstown, Ireland; Rio de Janeiro, Brazil; Portland, Me.; Boston, Mass.; Narragansett Bay, R. I.; New York, N. Y.; Old Point Comfort (Norfolk), Va.; Port Royal, S. C.; Havana, Cuba; San Francisco, Cal.; Puget Sound, Wash.; King George's Sound, and Princess Royal Harbor, in southwestern Australia.

Artificial Harbors.—These are as old as naval warfare, and may almost be said to date from the birth of commerce. The Phœnicians protected their little strip of the Levant coast. Tyre and Sidon were well provided with harbors, having effectual breakwaters, mainly built of loose rubble. Carthage, Greece, and Rome, each in its own way, utilized their harbors for commercial and warlike purposes. That of Carthage was artificial, those of Greece but slightly so, nature having provided so many navigable inlets that little remained to be done by man. The great harbors of Rome, constructed in the solid and workmanlike manner of her practical race, may still be studied with profit, for the coasts of Italy yet show how well the Romans understood both the principles and the practice of this branch of marine engineering. One of their finest and most complete constructions of this nature was the port of Ostia, at the mouth of the Tiber, now more than two miles inland. The Romans were distinguished in harbor-making by the open or arched mole or enclosing work, which gave full play to the currents, preventing the deposit of sand or mud. 'The foundations of Nero's port,' says Addison, 'are still to be seen. It was altogether artificial, and composed of huge moles running round it, in a kind of circular figure, except where the ships were to enter.' Harbor-making came to an end with the decay of commerce and civilization consequent upon the fall of the empire, to be revived by the Italian republics of the Middle Ages. The rich traffic of Venice and Genoa soon led to the construction of suitable ports at those places, and the moles of the latter city and the works in the lagoons of Venice remain to this day. France was next in the field, embanking, protecting, and deepening the mouths of the

rivers along her northwestern shores, as at Havre, Dieppe, Dunkirk, etc. In 1627, during the siege of Rochelle, Metezeau constructed jetties of loose rubblestone, to prevent access to the city.

British Harbors.—Great Britain, whose ocean commerce is of comparatively recent date, lagged far behind her Continental rivals. With few exceptions her ports were absolutely unprotected, or rather uncreated; and this state of things continued until late in the 18th century. Two of the few exceptions were Hartlepool, where a harbor was formed about 1250, and Arbroath in 1394; in the 17th century at Whitby and Scarborough rough piers wer thrown out, protecting the mouth of the port; at Yarmouth a north jetty, and subsequently a south one, were formed; an ancient mole existed at Lyme Regis; but the chief efforts of the early English engineers were directed against the shoals and waves of Dover. When, however, John Smeaton rose to vindicate the engineering talent of England, things took a different turn, and now few countries surpass Great Britain in the number of artificially improved commercial harbors. In Great Britain the construction and regulation of harbors is primarily under authority of the crown, but Parliament now usually names commissioners and boards with powers of ownership or management specially conferred by that body. All individual owners are required to manage harbors subject to the rights of public use, while final government control of them is practically absolute.

Harbors in the United States.—In this country all harbor making in a public sense has been done since the beginning of the 19th century. The date of its first undertaking is 1802, when the project of building public piers in Philadelphia received government aid by an appropriation of $30,000. Twenty years later, for a harbor of refuge in Delaware Bay, $22,700 was appropriated; and in 1826 appropriations aggregating about $150,000 were made for river and harbor improvements at many places. From this time river and harbor bills have steadily increased the Congressional appropriations, which now amount in the aggregate to hundreds of millions.

Federal control over the ports of the United States, including all the important harbors, is exercised under the constitutional power of the government to regulate commerce; but in most of the details of harbor management—such as ownership and use of wharves, docks, warehouses, and the provision and disposal of facilities generally—management is left to the States. Pilot laws, the appointment of harbor-commissioners, harbor-masters, etc., and all other harbor regulations are made and enforced by the States, subject in certain things—as, for example, quarantine rules— to the jurisdiction of the Federal government. Consult: Rennie, *Harbors*; Stevenson, *Design and Construction of Harbors*; Moore, *History of the Foreshore and the Law Relating Thereto*; Harcourt, *Harbors and Docks*; Birdseye, *Laws of the State of New York* (Navigation Law

and New York Harbor); United States Revised Statutes, Secs. 5,244-5,255. See BREAKWATER; DOCKS; JETTIES; LIGHTHOUSES.

HARBOR GRACE: town, cap. of Harbor Grace dist., Newfoundland; on an arm of Conception Bay; lat. 47° 41′ 28″ n., long. 53° 12′ 33″ w.; 30 m. w.n.w. of St. Johns. It has a splendid harbor, 5 m. in extent, largely open to the sea but with commodious and safe wharfage and inner anchorage. It is the seat of a Rom. Cath. bp., contains a handsome cathedral, court-house, jail, convent, several public and parish schools, gas and water-works, govt. savings bank, and a weekly newspaper; and has large trade in cod and seal. It ranks after St. Johns in commercial importance and population. Pop. (1901) 5,184.

HARBOR SEAL, or HAIR SEAL, the common small seal (*Phoca vitulina*), once common on both sides of the North Atlantic, down to Virginia in the United States, but now only occasionally seen south of Cape Cod. See SEAL.

HARBOR SPRINGS, Mich., village, county-seat of Emmet County; on Little Traverse Bay, an arm of Lake Michigan, and on the Grand Rapids & I. R.R. The land-locked harbor is much used by lumber vessels. The village is in a part of the State where the large forests make lumbering the chief industry. The chief manufactures are flour and lumber. The cool climate in summer makes Harbor Springs a favorite resort during July and August. Pop. 1,750.

HARBURG, *hăr'bûrċh:* old town and rising seaport of Hanover, province of Lüneberg, four and a half m. s. of Hamburg, on the southmost branch of the Elbe, in a marshy district at the foot of a wooded chain of hills. It is an important Prussian station for collecting customs. Sugar-refining and tanning are extensively carried on, as well as manufactures of woolens, linens, and hosiery. Its transit trade with Hamburg and the countries s. of the Elbe, which has long been considerable, has recently received favorable impetus by the construction of the Hanover and Harburg railway, and by the deepening and enlarging of its harbor, which can now accommodate 500 vessels, and admits of landing cargoes at the wharves. The passenger-traffic between Harburg and Hamburg is carried on by steamers and ferryboats as well as by rail Harburg is a place of holiday resort for the Hamburgers. Pop. 49,150.

HARCOURT, *hâr'kōrt,* Sir WILLIAM GEORGE GRANVILLE VENABLES VERNON, LL.D.: lawyer and statesman; b. England, 1827, Oct. 14; d. Malwood, Hampshire, 1904, Oct. 1. He graduated at Trinity College, Cambridge, 1851; was called to the bar 1854, and became a Q.C. 1866. In 1858 he made an attempt to enter Parliament as an Independent Liberal, but was defeated. During these years he wrote largely for the *Saturday Review* and other journals, and in 1860 attracted considerable attention by a

series of letters on international law and kindred subjects contributed to *The Times* over the signature of 'Historicus,' and which he continued throughout the American Civil War. In 1868 he entered Parliament as Liberal member from Oxford, serving his constituents at that post till 1880, when he was defeated for re-election. He was, however, selected to represent Derby and continued in that position until 1895, when, having been defeated at the general election, he found a seat in West Monmouthshire. In 1869 he was elected Whewell professor of international law at Cambridge; at the same time he was appointed a member of the royal commission for amending neutrality laws and for amending the naturalization laws. He was appointed solicitor-general in 1873, but held the office only three months, and in the same year was knighted by the queen. Although he had not supported Mr. Gladstone during his retirement from power, yet upon that statesman's return to the office of prime minister in 1880, he was appointed secretary of state for the home department, continuing in that capacity until the Liberal party went out of power in 1885. At that time his name became famous through his connection with the 'Ground Game Act' (1880), the 'Arms (Ireland) Act' (1881), and the 'Explosives Act' (1883), the last one being pushed through all its stages in the shortest time on record. In 1884, his bill for unifying the municipal administration of London was introduced. Upon the return of the Liberals to power in 1886, he was made chancellor of the exchequer, holding that position only a short time, as the fortunes of politics again took him from office. During the years 1880 to 1892 he was Gladstone's lieutenant in political life, and his services were of immense value, especially on account of his brilliant oratorical powers. Again in 1892 he was made chancellor of the exchequer, acting as such until 1895. It was during this term, in 1894, that he introduced and carried his famous tax budget, in which the income tax became more graduated and the 'death duties' on real and personal property were equalized, thereby giving the government much aid in solving their financial problems. Upon Gladstone's retirement in 1894, Harcourt was looked upon as his successor, but his title was ignored and Lord Rosebery appointed in his stead. Sir William then became leader of the Liberals in the House of Commons, and it became evident that he and the new prime minister did not agree as to party policy, and, though their differences were from time to time patched up, it was clear in his defeat at Derby in 1895 that the party was divided on many issues, and the effect was then seen of Sir William's Local Veto Bill, not only in the utter rout of the Liberals, but in the setback given to temperance legislation. From 1895 to 1900 he represented West Monmouthshire in the House of Commons, but the task of leadership of the Liberal party became particularly onerous because of the tendency of the various sections to break away from control. In the

session of 1896, against the overwhelming Unionist majority, he scored several successes, but was severely criticised by his own party for concurring in the majority report of the special committee, of which he was a member, appointed in 1897 to investigate the Jamieson Raid and the British South Africa Company. The internal dissensions in the cabinet became more marked as time went on, and the divided counsels manifest among the leaders of the Liberals led to his decision to retire from the leadership of the party on the floor of the House of Commons, and in 1898 with John Morley he retired from active work and thereafter sat as a private member. As a private member, he no longer restrained his attacks on the government, paying not the least deference to Liberal imperialism. He actively opposed the government's policy with regard to the sinking fund, their attitude in the negotiations with the Transvaal, and the financing of the South African war, and throughout the war he lost no opportunity in criticising the South African developments. In 1898–1900 he became prominent, both on the platform and in his letters to *The Times*, in advocating active measures against ritualistic practices in the Established Church. In 1904, March, he retired from public life and died in October.

HARD, a. *hârd* [Ger. *hart;* Icel. *hardr;* Goth. *hardus;* AS. *heard* hard—allied to Gr. *kartos*, for *kratos*, strength]: not easily penetrated; firm; solid; not soft; not easy to be done or executed; laborious; fatiguing; severe; oppressive; avaricious and exacting; unkind; rough; sour, as applied to beer, etc.; unprosperous, as hard times; rigorous, as hard frost; coarse, as hard fare; in the *fine arts*, applied to a style which rejects the graces, and too rigidly adheres to the mere mechanism of art: AD. close; near; earnestly; diligently, as to read hard, to work hard; importunately; with great force. HARD'LY, ad. *-lĭ*, scarcely; barely; rigorously; grudgingly. HARD'NESS, n, power of resistance in bodies (see HARDNESS, SCALE OF); obduracy; coarseness; austereness; stinginess; difficulty to be understood or executed. HARD'ISH, a. *-ĭsh*, somewhat hard. HARD'SHIP, n. toil; severe labor; oppression; injustice. HARD BY, near, close at hand. HARD-BAKE, *-bāk*, a sweetmeat of baked sugar, sometimes with blanched almonds. HARD-CURED, a term used in the fishing industry to designate that the fish specified has been cured by being thoroughly dried in the sun after salting, a process by which all the moisture has been evaporated. HARD-DRINKER, one who drinks intoxicants to excess. HARD-EARNED, *-ėrnd*, earned with toil and difficulty. HARD-FAVORED, coarse in features; of an ill-natured countenance HARD-FEATURED, having strongly marked features. HARD-FISTED, having hard, strong hands; covetous. HARD-FOUGHT, vigorously contested. HARD-HANDED, having hands rendered hard and horny with labor; coarse. HARD-HEADED, shrewd; intelligent. HARD-HEARTED, having an unfeeling heart; pitiless; cruel; merciless. HARDIHEAD, in *OE.*, for hardihood: see under HARDY. HARDIMENT, n

in *OE.*, stoutness of heart; bravery. HARD-LABOR, an addition to the sentence of imprisonment on a criminal, implying bodily toil at some occupation: the labor is usually of a low kind with coarse materials, and except in sickness, for 10 hours daily HARD-MOUTHED, not obeying the rein; not feeling the bit; not easily governed. HARD UP, in *familiar language*, an inconvenient shortness of ready money; inconvenient deficiencies in ways and means; without money or resources; in extremity. HARD-VISAGED having a coarse, harsh countenance. HARDWARE, commercial term for common goods or *ware* made of iron or other metal, as pots, pans, knives, locks, keys, anvils, grates, shovels; ironmongery. HARD WATER, water containing lime salts to an excess which prevents it forming a lather with soap. HARD-WON, obtained with difficulty or severe toil. TO DIE HARD, to die after a protracted struggle for life. HARD-A-LEE, the helm put close to the lee side of the ship. HARD-A-PORT, the position of the helm close to the larboard or port side of a ship. HARD-A-STARBOARD, the helm close to the starboard side of a ship. HARD-A-WEATHER, the position of the helm on the windward side of the ship.—SYN. of 'hard, a.': firm; solid; arduous; difficult; painful; distressful; cruel; vigorous; unfavorable; insensible; inflexible; unyielding; stubborn; stern; unhappy; vexatious; keen; severe; powerful; trying; vehement; unreasonable; unjust; forced; forcible; austere; harsh; stiff; constrained;—of 'hardly': scantily; unfavorably; severely; rigorously; oppressively; unwelcomely; harshly;—of 'hardness': durableness; scarcity; penury; harshness; keenness; savageness; barbarity; stiffness; parsimony.

HARDECANUTE, *hâr-dē-ka-nūt'*, HARTHACNUT, or HARDACNUT, king of England and Denmark; son of Canute: b. about 1019; d. 1042, June 8. At the time of his father's death in 1035 he was in Denmark, where he was immediately recognized as king. His half-brother, Harold, however, who happened to be in England at the time, laid claim to the throne of that part of their father's dominions. For a time the mother of Hardecanute succeeded in holding Wessex in his name, while Mercia and Northumbria were held by Harold, such an allotment having been made by a witenagemote held at Oxford. Hardecanute was about to make an armed descent upon England, when Harold died (1040), and his brother peacefully succeeded him. He reigned till 1042, but his reign was not marked by any important event. He left the government almost entirely in the hands of his mother and the powerful Earl Godwin (q.v.), while he gave himself up to feasts and carousals.

HAR'DEE, WILLIAM JOSEPH, military officer: b. Savannah, Ga., 1815, Oct. 10. d. Wytheville, Va., 1873, Nov. 6. He was graduated at West Point in 1838; served with distinction in the Mexican War; and in the Civil War entered the Confederate army with the rank of colonel. He commanded a corps at Shiloh; and was promoted

lieutenant-general in 1862. At Perryville he commanded the left wing of the Confederate army and in December 1864 defended Savannah against General Sherman.

HARDEN, v. *hâr'dn* [from *hard:* AS. *heardian*]: to make or become hard, or more hard; to inure; to make unfeeling; to confirm in wickedness; to render firm or less liable to injury; to strengthen; to give to the rate or price greater fixity in its increase. HARDENING, n. *hâr'dn-ĭng:* N. greater fixity in the increase of the rate or price; the giving a greater degree of hardness to. HARDENED, pp. a. *hâr'dnd*, made hard; made unfeeling. HAR'DENER, n. *-dn-ẽr*, one who.—SYN. of 'hardened': obdurate; callous; obstinate; pertinacious; contumacious; unfeeling; unsusceptible; insensible; impenetrable; hard.

HARDEN, WILLIAM American historian: b. Savannah, Ga., 1844, Nov. 11. He left his studies in the schools of Savannah to join the Confederate army, serving throughout the Civil War in the 54th Georgia infantry and in the signal corps. After the war he studied law and was admitted to the bar in the early 70's. He was assistant librarian of the Georgia Historical Society from 1866 to 1869, when on Aug. 5 he was appointed librarian, a position he still occupies. He was a member of the board of managers of Telfair Academy of Arts and Sciences 1882–1904 and custodian since 1894; organizer and secretary of the Georgia Society of the Sons of the Revolution since 1891; and was a Democrat member of the Georgia House of Representatives from 1900–05. Since 1903 he has been librarian of the Savannah Public library. Has written much on historical subjects in magazines and journals.

HARDENBERG, *hâr' den-bĕrĉh*, FRIEDRICH VON (better known by his literary pseudonym NOVALIS): 1772, May 2—1801, Mar. 19; b. county of Mansfeld, Prussian Saxony; son of Baron von Hardenberg. His father, then director of the Saxon salt-works, was a religious man, member of the Herrnhut communion; and his mother is described as 'a pattern of noble piety and Christian mildness.' Young Hardenberg inherited the serious and reverential nature of his parents. He studied at Leipsic and Wittenberg. After a brief life, made beautiful by love, friendship, study, and literary activity, he died of consumption, in the arms of his friend, Friedrich Schlegel. His chief works are *Lehrlinge zu Sais* (Disciples at Sais); a Physical Romance, 'containing,' says Carlyle, 'no story or indication of a story, but only poetized philosophical speeches, and the strangest shadowy allegorical allusions;' *Heinrich von Ofterdingen*, intended, as he himself informs us, to be an 'apotheosis of poetry,' but which he was not spared to finish; and *Hymnen an die Nacht* (Hymns to the Night). 'Hardenberg,' says Carlyle, 'is the most ideal of idealists. A devout, profound, beautiful, but indefinite aspiration breathes through all the fragments that he has left. What he lacks is activity and vigor, and in his poetry definiteness of conception.' Hardenberg belonged to the romantic

school of German literature, but took no part in the controversies of his friends. His *Sämmtliche Schriften* were published 1802 (5th ed. 1837) by Tieck and F. Schlegel, the former of whom prefixed a biography. See Carlyle's *Miscellaneous Essays*.

HAR'DENBERG, Karl August, Prince von: 1750, May 31—1822, Nov. 26; b. Essenroda, in Hanover: Prussian statesman. He was educated at Leipsic, Göttingen, and Metzlau, and 1776–78 travelled in Germany, France, Holland and England. On his return to Hanover, he became privy-councillor of the exchequer, and was raised to the rank of count; but a quarrel with the Prince of Wales, originating in a matter deeply affecting his honor, induced him, 1782, to quit the service of the Hanoverian government, and to go to the court of Brunswick, where the duke appointed him, 1787, pres. of the council of state. He was also commissioned by his master to convey the will of Frederick the Great, deposited in the duke's hands, to the new king, Frederick-William, who received him with marked distinction. In 1790, the markgraf of Anspach and Baireuth having requested the Prussian monarch to furnish him with a person competent to administer the affairs of his dominions, Frederick-William recommended Hardenberg. After Anspach and Baireuth were united with Prussia 1791, Hardenberg was appointed Prussian minister of state, and member of the cabinet ministry. At the commencement of the war with France, the king summoned him to his headquarters at Frankfurt-on-the-Maine as administrator of the army. Early in 1795 he was sent to Basel, where, April 5, he concluded a peace between Prussia and the French republic. On the accession of Frederick-William III., 1797, Hardenberg was recalled to Berlin, and intrusted with the management of all foreign affairs. In 1804 he became first Prussian minister on the resignation of Haugwitz, and in this capacity endeavored to preserve neutrality between France and England. But when the French troops attacked Anspach, he changed his policy, and addressed a strong remonstrance to Marshal Duroc. After the victory of Napoleon at Austerlitz, Prussia was compelled to enter into arrangements with Napoleon, Hardenberg was deprived of his office, and Haugwitz, who was friendly to the French, returned to power. In 1806, Prussia was again led to declare war, and after the fatal battle of Jena, Hardenberg held the portfolio of foreign affairs at the desire of Emperor Alexander. In 1810 he was appointed chancellor of state. Prussia was at this period in a deplorable condition, humbled in the dust before France; nevertheless, Hardenberg was sagacious enough to perceive that the power of Napoleon was on the wane. He labored ardently to create a national feeling —a patriotic thirst for vindication. The victories of the British troops in the Spanish peninsula, and the disasters that overwhelmed Napoleon's vast army in Russia, greatly assisted his efforts, and he had the satisfaction of seeing their success. His exertions were unwearied; he subscribed

to the peace of Paris, 1814, June; and was raised to the rank of prince by his sovereign. He accompanied the allied sovereigns to London, took part in the proceedings of the congress at Vienna, and in the treaties of Paris (1815). In 1817, he reorganized the council of state, of which he was appointed president. He was present at the congresses of Aix-la-Chapelle, Carlsbad, and Vienna, and drew up the new Prussian system of imposts. During a tour through n. Italy, he was taken ill at Pavia, and died at Genoa. The services rendered by Hardenberg to his country were great; to him mainly Prussia is indebted for improvements in her army system, with the abolition of serfdom, of the privileges of the nobles, and of a multitude of trade corporations, beside the complete reform of her educational system. The MSS. of his memoirs of the period from 1801 to the peace of Tilsit, were sealed up by Frederick-William III., who deposited them in the archives of the state, and forbade them to be opened before 1850. See Von Ranke's *Denkwürdigkeiten des Fürsten von Hardenberg* (4 vols. 1877).

HARDENING: a process used in hat-manufacturing, by which the bodies of the hats are rubbed and pressed hard for the purpose of felting the material as well as to diminish the size and render them more dense. A hardening-kiln is a kiln in which the transfer printing process in pottery is completed: The pottery being relieved from all superfluous oils by exposure to a low heat. HARDENING of a metal is the result of an increase in its density. Few metals are capable of being hardened. The hardening of steel is effected by heating it to a cherry-red temperature and then chilling or cooling it suddenly by plunging it in water, oil, or other suitable solution, or by exposing it to a cold blast. The degree of hardness that may be attained depends upon the suddenness of the chilling. In hardening and tempering tools such as machine knives, taps, long twist-drills, reamers, milling cutters, etc., the danger of warping them by uneven heating, or by cold draughts, is avoided by heating them in special hardening and tempering furnaces.

HARDHACK. See SPIÆA.

HARDHEAD. See MENHADEN.

HAR'DIE, JAMES ALLEN, American soldier: b. New York, 1823, May 5: d. Washington, D. C., 1876, Dec. 14. He was graduated from the United States Military Academy in 1843, entered the artillery, during the Civil War served on the staffs successively of Generals McClellan and Burnside, was judge-advocate-general of the Army of the Potomac on Hooker's staff, became brigadier-general of volunteers in 1862, and inspector-general with rank of colonel in 1864. He was brevetted major-general, United States army, in 1865. His writings are largely confined to military reports.

HARDIE, JAMES KEIR, English labor leader: b. Lanarkshire, 1856, Aug. 15. He worked in the coal mines until

1879, when he was blacklisted on account of his activity in organizing the miners; he was then appointed paid secretary of the miners' union. In 1886 he organized the Ayrshire miners, and in 1887 attended his first Trade Union Congress. He was one of the founders of the Independent Labor Party, and was elected member of Parliament in 1888, 1892, and 1900. He is proprietor and editor of a weekly paper, the *Labour Leader*.

HARDIE, Robert Gordon, American portrait painter: b. Brattleboro, Vt., 1854, Mar. 29; d. Brattleboro, Vt., 1904, Jan. 9. He studied drawing at the Cooper Union Institute, the Academy of Design, and the Art Students' League, N. Y., and at Paris became a pupil of Gérôme. He exhibited at the Salon in 1880 and following years, and in 1882 studied under Cabanel. A picture of his appeared at the Exhibition of the National Academy of Design in 1888, and he exhibited a portrait of his wife at the World's Columbian Exposition in 1893.

HARDIN, *hâr'dĭn*, John: 1753, Oct. 1—1792, Apr.; b. Fauquier co., Va.: soldier. While a boy he became an expert marksman and familiar with Indian life; was a scout and ensign in Lord Dunmore's expedition 1774; was appointed lieut. in Daniel Morgan's rifle corps at the beginning of the revolutionary war; removed to Ky. 1786, accompanied Gen. Clarke on the Wabash expedition, was appointed lieut. col. of Ky. militia, commanded a detachment under Gen. Harmar in the fight with the Miami Indians 1790, led a successful expedition against the Indians 1791, was sent by Gen. Wilkinson to the Miami Indians with overtures of peace 1792, Apr., and was shot by an Indian while advancing under a flag of truce.

HARDING, *hârd'ĭng*, Chester: 1792, Sep. 1—1866, Apr. 1; b. Conway, Mass.: portrait-painter. He became a house and sign painter in Pittsburg, Penn., while a boy; began painting portraits without instruction; painted 100 crude ones in 6 months for $25 each, studied in Philadelphia, St. Louis, and London, and opened a studio in Boston 1827. He made a second visit to England 1843, and afterward passed his winters in various U. S. cities though making Boston, and in later years Springfield, his home. As a portrait-painter no less than as a genial gentlemen, he was exceedingly popular in England and the United States. Among those who sat to him were the Dukes of Sussex, Hamilton, and Norfolk, Sir Archibald Alison, Samuel Rogers, James Madison, James Monroe, John Quincy Adams, John Marshall, Charles Carroll, John C.Calhoun, Henry Clay, Daniel Webster, John Randolph, William Wirt, and—his last work—Gen. William T. Sherman.

HARDING, *hârd'ĭng*, Stephen: Cistercian monk, third abbot of the celebrated monastery of Citeaux, one of the most remarkable religious reformers of the 12th c.: d. 1134. Of his parentage and youthful history, little is known beyond the fact that he was of a noble English family, and in early life a soldier. Under one of those

religious impulses frequent in the middle ages, he undertook a pilgrimage to Rome. He subsequently entered the French monastery of St. Claude de Joux, where he was so distinguished by his strict and exemplary life, that he was chosen abbot of the monastery of Bêze, with a view to the reformation of its relaxed discipline. From this monastery he was transferred to that of Citeaux, where, on the death of Alberic, 1109, he was elected abbot. The rigor of observance which he here enforced so deterred novices from entering the new order, that at first grave fears were entertained for its stability; but Stephen, placing his trust in his good cause, persevered; and he was rewarded, 1113, by the accession of St. Bernard and 30 other youths, whose eminent virtue gave such impulse to the institute, that in a short time the number of claimants for admission compelled him to found several new convents, especially that of Clairvaux, which under the rule of St. Bernard, attained the very highest distinction in that age. Abbot Stephen, 1119, with St. Bernard and others of the brotherhood, drew up the well-known constitutions of the order, *Carta Caritatis*, which, approved by Pope Calixtus II. and Eugenius III., have, with some modifications, continued to modern times, as the rule of the Cistercian institute.

HARDINGE, *hâr'dĭng*, Henry Hardinge, Viscount; field-marshal and commander-in-chief of the British army and gov. gen. of India: 1785, Mar. 30—1856, Sep. 24; b. Wrotham, Kent; third son of the Rev. H. Hardinge, rector of Stanhope, county of Durham. He was gazetted as ensign before he had attained his 15th year. He obtained a brigade command before his 25th year, and his foreign grade was commuted, shortly afterward, for British rank, after which he was attached to the Portuguese army, 1809–13, as deputy quartermaster-general. When Napoleon effected his return from Elba, Hardinge joined the allied armies in Belgium, and was appointed by the Duke of Wellington commissioner at the Prussian headquarters. He lost his hand at Ligny, and was thus unable to participate in the crowning victory of Waterloo. In 1826, he entered parliament; 1828, succeeded Lord Palmerston in the govt. of the Duke of Wellington, as sec. at war. He next filled the office of sec. of Ireland, and 1844–47 was gov. gen. of India. When the great Sikh war broke out, he hurried to the n.w. frontier of India, and served as second in command under Lord Gough in the sanguinary battles of Moodkee, Ferozeshah, and Sobraon. After the pacification of Lahore, his services were rewarded by a viscounty, the E. Indian Company granting him a pension of £5,000, and parliament voting him an annuity of £3,000, for himself and his next two successors. On the death of the Duke of Wellington 1852, Hardinge was appointed commander-in-chief of the British army, and filled that post during the Russian war. In 1885, Oct., he was advanced to rank of field-marshal. He died at his seat, South Park, near Tunbridge, Kent.

HARDNESS, Scale of: quality of a body measured by its power of scratching other substances. Variations in the degree of hardness of different crystallized bodies often furnish a valuable physical sign by which one mineral may be readily distinguished from others closely resembling it. Mohs selected ten well-known minerals, each succeeding one harder than the preceding one, and thus formed the *Scale of Hardness*, generally adopted by subsequent mineralogists. Each mineral in the following table is scratched by the one that follows it, and consequently by all the subsequent ones, and the hardness of any mineral may be determined by reference to the types just selected. Thus, if a body neither scratches nor is scratched by felspar, its hardness is said to be 6; if it should scratch felspar but not quartz, its hardness is between 6 and 7—the degrees of hardness being numbered from 1 to 10. The figures on the right indicate the number of known minerals of the same or nearly the same degree of hardness as the substance opposite to which they stand:

SCALE OF HARDNESS OF MINERALS.

1. Talc	23	6. Felspar (any cleavable variety)	26
2. Compact gypsum, or rock-salt	90	7. Limpid quartz	26
3. Calcspar (any cleavable variety)	71	8. Topaz	5
4. Fluor-spar	53	9. Sapphire, or Corundum	1
5. Apatite	43	10. Diamond	1

The cause of the varieties of hardness in different bodies is not known. The same substance—e.g., a piece of steel—may, in different circumstances, be so soft as to take impressions from a die, or may be nearly as hard as a diamond.

HARDOCK, n. *hâr'dŏk* [*hoar*, and *dock:* AS. *hár;* Icel. *harr*, hoary, white]: dock with whitish leaves; probably the plant colt's-foot, *Tussĭlāgō farfăra*, sub.ord. *Corymbĭfĕræ*, ord. *Compŏsĭtæ*, green on the upper side of its large leaves, and white like hoar-frost on the under.

HARDOUIN, *âr-dwăng'*, Jean: 1646–1729, Sep. 3; b. Quimper, Brittany, where his father was a bookseller. Hardouin received his first education in the schools of the Jesuits, entered that order at the age of 20, and completed his studies in Paris. On the death of Père Garnier 1683, Hardouin was appointed librarian of the college of Louis le Grand, in which office he had leisure for the literary pursuits in which he delighted, and in which his extravagances have acquired for him a notoriety almost without parallel in the annals of literary eccentricity. Dupin places him among the very first scholars of his learned brotherhood. In a spirit of literary skepticism which it is difficult to look upon as serious, he maintained, not only that the entire body of classical literature, except in Latin, Pliny's *Natural History*, Virgil's *Georgics*, the comedies of Plautus, and Horace's *Satires*, and in Greek, Homer's *Iliad*, and Herodotus's *History*, was falsely ascribed to the authors whose various names it bears, but also that it all was the production of monks of the 13th c.! In the same skeptical spirit, he rejected as spurious all the reputed

remains of ancient art, with the inscriptions and coins attributed to classical times; he extended the same skepticism to the Septuagint version of the Old Testament, and even to the Greek text of the New, the original language of which he held to have been Latin! Opinions so extravagant naturally called forth the reprobation of the authorities of the Jesuit order. He was required to retract them; and there is some reason to believe, that they were put forward by him rather from love of paradox and morbid desire of notoriety, than from any serious conviction of their probability. Nevertheless, with all this extravagance, the erudition of Père Hardouin was beyond dispute, and most of his works are of great historical and critical value. His edition of Pliny (5 vols, 4to, Paris 1689) is a prodigy of learning and industry. Of his remaining works, the most valuable is his great *Collectio Conciliorum* (12 vols. folio), a work of great learning and utility, which has the rare advantage of possessing one of the best indexes extant; a commentary on the New Testament in folio; several volumes on the study of numismatics and chronology; and a vast number of dissertations and essays in the *Memoires de Trevoux*. He died in the convent of his order in Paris.

HARDS, n. *hârdz* [AS. *heordas*]: the refuse or coarse part of flax.

HARDS, the designation of a faction of the Democratic party in the political history of New York from 1852 to 1860. They were distinguished from the 'softs' in their favoring alliance with the pro-slavery Democracy throughout the States. They were also called 'hardshells' and were identical with the 'hunkers' or conservative Democrats of 1845.

HARD'TACK, a cracker or biscuit, large, hard, and coarse, much used by soldiers and sailors. About 20 of these crackers are served daily to each man. When the United States soldiers were about to be shipped from Tampa to Cuba, during the Spanish-American war, two factories in Atlanta furnished the government in two days with 80,000 pounds (1,120,000) of hardtack.

HARDWARE. See under HARD.

HARD-WOOD'ED TREES: forest trees of comparatively slow growth, producing compact, hard and valuable timber, as oak, ash, elm, chestnut, walnut, beech, birch, etc. From these willows, elders, poplars, etc., are distinguished as *soft-wooded trees*. Neither term is extended to firs, pines, cedars, or other coniferous trees, the wood of which is peculiar.

HARDY, a. *hâr'dĭ* [F. *hardi*, daring, stout—from OF. *hardir*, to make strong. It. *ardito*, daring: W. *hyrrio*, to excite, to set on as a dog]: inured to fatigue; strong in body or in health; bold; brave; strong; stubborn to excess. HAR'DIER, comp. *-dĭ-er*, more inured to fatigue. HAR'DILY, ad. *-lĭ* stoutly; not tenderly. HAR'DINESS, n. firm courage; an enduring body derived from exposure and a

life of toil; excess of confidence; effrontery. HAR'DIHOOD, n. *-dĭ-hûd*, dauntless bravery; effrontery. FOOLHARDY: see under FOOL.—SYN. of 'hardihood': courage; audacity; audaciousness; intrepidity; stoutness; boldness; assurance: impudence; shamelessness;—of 'hardy': stout; daring; resolute; hard; firm; stubborn; intrepid; confident.

HARDY, *âr-dē'*, ALEXANDRE: 1560–1631; b. Paris: dramatist and actor. He began writing plays while a member of a strolling company of actors, published an edition of 41 of them 1624–28; became the dramatist of the Theatre du Marais; witnessed the early successes of Corneille (q.v.); and was author of more than 600 plays, mostly tragedies, but some comedies. His tragedy of *Mariamne* is his best known composition.

HAR'DY, ARTHUR SHERBURNE, PH. D.: author: b. Andover, Mass., 1847, Aug. 13; son of Alpheus Hardy of Boston. He graduated at the U. S. Milit. Acad. 1869, served a year as asst. instructer of artill. tactics there and on garrison duty in Fla., resigned 1870; was prof. of civil engineering and applied mathematics in Iowa College 1870–73; spent a year in study in Paris; was prof. of civil engineering in the Scientific School of Dartmouth College 1875–78; was prof. of mathematics in the college 1878–93; editor of the *Cosmopolitan Magazine* 1893–5; U. S. minister resident and consul-general at Teheran, Persia 1897–9; envoy extraordinary and minister plenipotentiary to Greece, Roumania, and Servia 1899–1901; to Switzerland 1901–3; and to Spain since 1903, Jan. 30. He has published several technical works, novels, and poems, including *Elements of Quaternions* (1881), *Imaginary Quantities* (1881) *New Methods in Topographical Surveying* (1884), *Francesca of Rimini*, poem (1878), *But Yet a Woman*, novel (1883), *The Wind of Destiny* (1886), *Songs of Two* (1900), *Elements of Calculus*; *Elements of Analytic Geometry*; *Passe Rose*; *His Daughter First* (1903); etc.

HARDY, EDWARD JOHN, English author and clergyman: b. Armagh, Ireland, 1849, May 7. He took orders in the English church, became an army chaplain and in 1903 was stationed at Hong Kong. He is known the world over as the author of *How to be Happy though Married* (1884), which has been translated into many languages. Other works by him, several of which have been extremely popular, as well in the United States as in England, are: *Manners Makyth Man* (1885); *Faint yet Pursuing* (1886); *Uncle John's Talks with his Nephews* (1886); *The Five Talents of Women* (1888); *The Love Affairs of Some Famous Men*(1897); *Mr. Thomas Atkins* (1900); *Concerning Marriage* (1901); *Love, Courtship and Marriage* (1902); *Pen Portraits of our Soldiers* (1902); *John Chinaman at Home* (1905);

HARDY, IZA DUFFUS, English novelist, daughter of Sir Thomas Hardy, the English historian. Among her numerous novels are: *Glencairn* (1877); *Only a Love Story* (1877); *A Broken Faith* (1878); *The Love that He*

Passed By (1884); an American novel; *A Woman's Loyalty* (1893); two volumes of transatlantic reminiscences, *Between Two Oceans* (1884), and *Oranges and Alligators: Sketches of South Florida Life* (1886); *Love, Honor and Obey*; *Hearts are Diamonds*; *Love in Idleness*; *The Lesser Evil*; *MacGilleroy's Millions*; *Man, Woman and Fate*; *A Butterfly* (1903); etc.

HAR'DY, Gathorne Gathorne-, Viscount Cranbrook: lawyer and statesman: b. Bradford, England, 1814, Oct. 1. d. Hempstead Park, 1906, Oct. 30. He graduated at Oriel College, Oxford, 1836, was called to the bar 1840, member of parliament for Leominister 1856–65, appointed under-sec. of state for the home dept. 1858, pres. of the poor-law board 1866, July, and sec. of state for the home dept. 1867–8. He defeated Gladstone at Oxford 1865, was made sec. of state for war by Disraeli 1874, raised to the house of lords as Viscount Cranbrook 1878; was sec. of state for India 1878–80, and lord pres. of the council in Salisbury's cabinets 1885 and 1886–92. He was created Baron Medway in 1892

HARDY, *hâr'dĭ*, Thomas: English novelist: b. in a Dorsetshire village, 1840, June 2, and articled at the age of 17 to an architect in Dorchester. Settled in London. he obtained important prizes for designs and for an essay on architecture in colored brick. He qualified to become an art critic, but tried a novel, *Desperate Remedies* (1871). *Under the Greenwood Tree* (1872) and *A Pair of Blue Eyes* (1873) were well received; and *Far from the Madding Crowd* (1874) was a marked success. The latter was dramatized by Hardy (1879). Other works are: *The Hand of Ethelberta, The Return of the Native, The Trumpet Major, A Laodicean, Two on a Tower* (1882), *The Mayor of Casterbridge* (1886), *The Woodlanders* (1887), *Tess of the d'Urbervilles* (1891), *The Three Wayfarers* (1893), *Jude the Obscure* (1895), *Wessex Poems* (1898), *Poems, Past and Present* (1901), *The Dynasts*, a drama, (Part I 1904); etc.

HARE, n. *hār* [Dut. *haas;* Sw. *hare;* Icel. *heri;* AS. *hara;* Ger. *hase*, the jumper, a hare]: a common field-animal like a rabbit, but larger, having a divided upper lip and long hind-legs. Harebrained, a. *-brānd*, unsettled and wild like the hare; giddy; heedless. Harelip, n. a cleft or division in the upper lip of a child (see below). Harelipped, a. *-lĭpt*, having a harelip. Harehound, a harrier, which see. Mad as a March hare, as mad as a hare in the rutting season, when they are wild, flighty. and strange.

HARE (*Lepus*): genus of rodent quadrupedes, of which there are many species very similar. The Linnean genus *Lepus* now forms the family *Leporidæ*, which includes the genera *Lepus* and *Lagomys*, and of which a peculiar characteristic is the presence of two small incisors immediately behind the ordinary rodent incisors of the upper jaw, so that these teeth seem to be double.

The molar-teeth, six on each side above and five below, are transversely grooved, being formed of two vertical plates soldered together. Hare is the common name of all the species of *Leporidæ* except the rabbit. All the animals of this family feed exclusively on vegetable food, chiefly herbage, though they are fond also of grain, roots, and the bark of trees. Their fore-feet have five toes; their hind-feet four; the soles are hairy. Their fur is soft; the colors mostly grey or brown. The alpine and arctic species becóming white in winter. The COMMON HARE (*L. timidus*) is widely distributed over Europe and northern and central Asia. The IRISH HARE (*L. Hibernicus*), sometimes described as a distinct species is a variety of the Varying or Mountain Hare (*L. variabilis*): its fur is of no value. The common hare is not found in Ireland. Notwithstanding the character of timidity usually ascribed to the hare it has some pugnacity, and shows courage in encounters with those of its own race; or with animals of nearly equal powers. It has been an object of the chase from a very early period. Xenophon, in his *Cynegeticus*, gives an enthusiastic description of the sport. Being evidently designed to seek safety from enemies by fleetness. the hare, however well supplied with food, never becomes fat. It ordinarily lies quiet in its *form*, usually a slight depression in the grass, during the day, and goes in quest of food in the evening and morning. Where it is preserved by the game laws, it grows abundant and does much damage to crops. It is prolific, though not nearly so prolific as the rabbit: the female produces two to five at a birth. The young (*leverets*) are born covered with hair, and with the eyes open. The VARYING HARE, MOUNTAIN HARE, or ALPINE HARE (*L. variabilis*), which inhabits the mountains of n. and s. of Europe, and is found (the 'Blue Hare') on those of Scotland and of Cumberland, is remarkable for its change of color without change of hair, on the approach of winter. Ordinarily of bluish-gray color, it becomes of a shining white, the change beginning with the feet, and extending upward, terminating with the back. It is about equal in size to the common hare but has shorter limbs and ears, and is less swift. In the arctic regions of America the ARCTIC HARE or POLAR HARE (*L. glacialis*) abounds; entirely white excepting the tips of the ears, through all the year: it has long soft fur on the belly, fine thick fur on the back; is considerably larger than the common hare, and spends the whole year without hibernation, even in Melville Island, and similar cold desolate regions; lichens and mosses probably affording its chief food.—North America produces also the American Varying Hare (*L. Americanus*), extending from the border of the arctic regions southward in some of its four varieties as far as New Mexico. It is smaller than the Mountain Hare, but like that changes color in winter. It is very abundant on the banks of the Mackenzie river. N. America produces a number of other species of hare, of which some (*L. aquaticus* and *L. palustris*) inhabit the

swamps of the southeastern states. India has a hare (*L. ruficaudatus*) very similar to the common hare; other species are found in other parts of Asia, Egypt, the Cape of Good Hope, etc. The fur of the hare is used for felting for making hats and for other purposes.

HARE, *här*, Augustus John Cuthbert: author: b. Rome, Italy, 1834, Mar. 13; d. St. Leonards, Sussex, 1903, Jan. 22. He was educated at Harrow and Univ. College, Oxford, and became a graceful and pleasing descriptive writer, publishing *Epitaphs for Country Churchyards* (1856); *Murray's Handbook for Berks, Bucks, and Oxfordshire* (1860); *A Winter at Mentone* (1861); *Walks in Rome* (1870); *Wanderings in Spain* (1872); *Memorials of a Quiet Life* (1872); *Days near Rome* (1874); *Cities of Northern and Central Italy* (1875); *Walks in London* (1877); *Life and Letters of Baroness Bunsen* (1879); *Cities of Southern Italy and Sicily* (1882); *Story of my Life* (6 vols. 1896–1900).

HARE, John Innes Clarke, American jurist: b. Philadelphia, 1817, Oct. 17. Graduated from the University of Pennsylvania in 1834, he was admitted to the bar in 1841, was successively associate and presiding judge of the Philadelphia district court (1851–75), and in 1875–95 presiding judge of the court of common pleas. He was also for a time professor of the institutes of law in the University of Pennsylvania, and published: *American Leading Cases* (1847; with Wallis), *The Law of Contracts* (1887); *American Constitutional Law* (1889), eleven volumes of chancery reports, and other works.

HARE, Julius Charles; 1795, Sep. 13—1855, Jan. 23; b. near Vicenza, Italy; of English parentage: theological writer. He went to England with his parents 1798; spent the winter 1804–5 at Weimar where he became acquainted with Goethe and Schiller; was educated at the Charterhouse School, London, and Trinity College, Cambridge, was asst. tutor at Trinity College 1822–32; abandoned the study of law for divinity; took priest's orders 1826, and obtained the rich family living of Hurstmonceaux in Sussex, where he acquired a library of 12,000 vols., notably large in German literature. Before settling in his parish he visited Rome, and there met the Chevalier Bunsen, who subsequently dedicated to him a portion of his *Hippolytus and His Age*. He was vicar of Hurstmonceaux 1832–40, archdeacon of Lewes 1840–51, prebendary of Chichester 1851–53, and chaplain to the queen 1853–55. In theology he was an evangelical broad-churchman. He was author of a large number of theological and controversial works, charges to his clergy, and sermons on special topics: and published with his brother, Augustus William H., *Guesses at Truth by Two Brothers* (1827); with Thirwall, a translation of *Niebuhr's History of Rome* (1828–32); *Vindication of Niebuhr's History* (1829). He published also *The Victory of Faith* (1840); *The Mission of the Comforter* (1846), and *Vindication of Luther against his recent English Assailants* (1854). He also edited the *Remains of John Sterling*, his

former curate (1848), which led Carlyle to publish his *Life of John Sterling* in disapproval of Hare's work.

HARE, Robert, m. d.: 1781, Jan. 17—1858, May 15, b. Philadelphia: scientist. He made a special study of chemistry and physics; invented the 'hydrostatic' blow-pipe 1801, for which he received the Rumford medal of the American Acad. of Arts and Sciences; perfected the calorimotor, a form of galvanic battery by which intense heat may be generated, 1816; and with this battery made the first successful application of voltaic electricity to subaqueous blasting 1831. He was appointed prof. of chemistry and natural philosophy in William and Mary College 1818, and the same year became prof. of chemistry in the medical dept. of the Univ. of Penn. He held this office till 1847, and on resigning presented his chemical and physical apparatus to the Smithsonian Institution. He wrote '*Brief View of the Resources of the United States* (1810); *Chemical Apparatus and Manipulations* (1836); *Memoir on the Explosiveness of Nitre;* etc.

HARE, William Hobart, s.t.d.: bishop of the Prot. Episc. Church: b. Princeton, N. J., 1838, May 17. He was educated in the Univ. of Penn.; ordained deacon 1859, June 19, and priest 1862, May 25; rector of St. Paul's Church, Chestnut Hill, Penn., 1861–63; in charge of St. Luke's, Philadelphia, 1863; and elected rector of the Church of the Ascencion, Philadelphia, 1864. He was for several years sec. and gen. agt. of the foreign committee of the Board of Missions; elected missionary bishop of Cape Palmas, Africa, and declined 1871; elected missionary bishop of Niobrara 1872, Oct., and had his jurisdiction extended and title changed to missionary bishop of s. Dakota 1883. He has done faithful and successful work among the Indians of his diocese.

HARE'BELL, or Blue'bell (*Campanula rotundifolia*) [named perhaps from *hare* (the animal), or from the *hairs* on its style; but prob. the name is a corruption of *heather-bell*]: common species of Bellflower (see Campanula), growing abundantly on heaths, or in dry and hilly pastures, on waysides, etc., throughout Britain and N. America. It flowers in summer and autumn. It is common in most parts of Europe, even to the extreme north. It is everywhere a favorite from its beauty and gracefulness, and is the subject of many allusions in poetry. It is a perennial plant, with a slender stem 6–14 inches high, sometimes bearing only one flower, but generally a loose panicle of a few drooping flowers, on very slender stalks; the flowers sometimes white, but usually bright blue, bell-shaped, and fully half an inch long. The juice of the flowers yields a fine blue color, and may be used as ink.

HARELD, *hăr'ĕld* (*Harelda*): genus or sub-genus of ducks of the oceanic section (see Duck), nearly allied to pochards, scaups, etc.; having a short, thick bill, high at the base, the laminæ projecting at the edge of the mandibles, a high forehead, a thick neck, and two feathers of the

middle of the tail in the males greatly elongated; while the females have the tail short and rounded.—The Long-tailed Duck, or Hareld (*H. glacialis*), inhabits arctic regions of the old and new worlds, remaining on the seas of the north as long as any water remains unfrozen, and then betaking itself to more southern regions. It is plentiful, during winter, in the inlets of Orkney and Shetland. Its winter migrations in America extend as far south as Texas. The male, particularly in its summer plumage, is a beautiful bird. It is about 17 inches long, without the long tail-feathers; with them, 22 or 24 inches. It is very lively and noisy; flies swiftly, and is an expert diver. It lines its nest with down, said to be equal to that of the eider, but it has not yet become an article of commerce.

HAREM, n. *hă′rĕm*, also Ha′ram, n. *-răm* [Ar. *-harama*, to forbid, to deny access: Pers. *haram*]: apartments allotted to females among Eastern families, a seraglio. The word has a different signification among different peoples. In Arabic *el-harim* refers to the holy cities of Mecca and Medina as well as the temple of Mecca (*mesjid el harim*), and in the form of *haram* it designates the sacred inclosure of the principal mosque at Cairo and at Jerusalem (*Haram esch-Scherig*). But its most general application is to that portion of a polygamist's house set apart to the exclusive occupation of his wives and their attendants, a common arrangement in the Mohammedan world, based on a passage in the Koran which specifies how many wives a good Mussulman may have, and how they shall deport themselves and be maintained. The harems of the Sultan of Turkey and the shah of Persia are accepted as the most elaborate and perfect types of the system to-day; yet it prevails with more or less vigorous regulations among the Jews, Babylonians, Siamese, Greeks, Armenians, Chinese, Javanese, and Japanese. The Koran limits the number of wives that a Mussulman may have to four, excepting the sultan, who may have seven; in Japan men generally have but one wife, but princes and nobles may have as many concubines as they can maintain; and in Siam, while none but the king can have more than one wife, concubinage also is permitted to the extent of a man's means. The regulations for the government of harems and the privileges of the occupants also differ materially. At the present day the Persian harem is subject to the strictest rules; while those of Turkey and Egypt—once the most exclusive of all—have attained a laxity of form and government that permits the women, under attendance, to promenade the streets and bazaars, with only the lower part of the face covered, and that by a white veil so thin that the features may be readily seen. In Turkey and Egypt, since 1861, the ancient restraint has been lessened to a degree that has allowed American and European ladies of high official standing to visit the harems, as a mark of special favor on the part of the sultan or khedive. Harem life has been described in more or less detail by Lady Mary Montagu, Turkey, 1793; Harriet Martineau, Cairo, and

Damascus, 1847; Lady Shiel, Persia, 1849; Mrs. Caroline Paine, Turkey, 1859; Mrs. S. Harvey, Turkey, 1871; two ladies of William H. Seward's family, Hiogo, 1870, and Cairo, 1871; and Mrs. Leonowens, Bangkok, 1873; and in Ersch and Gruber's *Encyclopädie;* the *Serraglio del gransignore descritto;* the *Revue des Deux Mondes* (1852); Lempriere's *Tour to Morocco* (1793); Count de Beauvoir's *Voyage Round the World* (1870); and Dr. Häutzsche's *Zeitschrift für allgemeine Erdkunde* (1864); There is scarcely any similarity in all these accounts, because of the differences in the systems, nor is it possible to form any general opinion of the condition of the women, because there is no harmony in the types. In some harems they are described as lacking in intellect, lazy, gross, and bound to a life of comparative solitude; in others as bright, cheerful, refined, polite, fond of reading and of vocal and instrumental music. In general they are provided with luxurious surroundings, the richest apparel and the most costly jewels. They are graded according to the mode of their selection or their caste-standing. Some are wives and others concubines, and the latter may be daughters of high-caste families and nobles, or pretty slaves bought by, or more commonly presented to, the sovereign or subordinate rulers. The mother of the emperor of China selects his principal wife and his chief concubines from the noble families of the realm, and the mother of the sultan of Turkey selects his favorites from among the odalisks or female slaves. The wife of the sultan who first gives birth to an heir to the empire receives the title of *Sultana hasseky*, his mother is known as the *Sultana valide*. The two sultanas, the wives, and the favorite odalisks, have each a separate suite of apartments, attendants, and eunuchs. Bangkok, cap. of Siam, contains within its limits a double-walled city in which none but women and children live. It is a beautiful miniature city, set apart exclusively for the occupancy of the royal princesses, the wives, concubines, and relatives of the king, and their slaves and personal attendants.

HARE'S-EAR (*Bupleurum*): genus of plants of nat. ord, *Umbelliferæ*, having compound umbels of yellow flowers, and generally simple leaves. The leaves of a common species, *B. rotundifolium*, embrace the stem and are roundish oval. This plant, which grows in corn-fields in some chalk districts, is the *Thorough-wax* of the old herbalists, and was in repute as a vulnerary, but has fallen into disuse, The species are numerous, and are natives of temperate climates in most parts of the world.

HARFLEUR, *âr-flër'* (called in the middle ages *Hareflot* and later *Harflew*): small maritime town of France, dep. of Seine-Inférieure, near the mouth of the Lézarde, on the n. bank of the Seine, about 4 m. e. of Le Havre. The chief building is a beautiful Gothic church with an elegant tower, built by the English as a memorial of the victory of Agincourt. The people are employed in fishing and rearing cattle. In former times, before the rise of Havre,

Harfleur was a flourishing town, the key to the entrance of the Seine. Its harbor now forms a meadow. It was taken by the English under Henry V. 1415, retaken by the French 1433; it was again seized by the English 1440, and ten years later was recaptured by Charles VII. of France. Of this town the Duke of Bedford took or destroyed nearly 500 French ships, 1461, Aug. 15.

HARGRAVES, *hâr'grāvz*, Edmund Hammond: discoverer of gold in Australia; b. Gosport, England, 1816; d. Sidney, N. S. W., 1891, Oct. 1. He was bred to the sea, and after visiting nearly every part of the world, became a farmer and stock-raiser in Australia 1834. In 1849, he was seeking gold in California, and while working in the diggings there noticed a similarity between the geology of California and Australia. He returned to Australia 1851, began searching for gold, and announced the discovery of it in the Bathurst dist. Apr. 30. Within a year nearly $20,000,000 worth of gold was exported from Victoria and New South Wales. Hargraves was appointed commissioner of crown lands, granted $50,000 by the New South Wales council, received other private and public rewards. and returned to England 1854.

HARGREAVES, *hâr'grēvz*, James: artisan, inventor (in 1760) of the carding machine, and the spinning jenny, used in cotton manufacture: b. Stanhill, near Blackburn, England; d. 1778, Apr. Hargreaves was illiterate, and supported himself and family by weaving and spinning in his own house, according to the custom of the time. In 1760, he invented the carding-machine, as a substitute for the use of hand-cards; and four years later, he produced the spinning-jenny. Hargreaves had frequently tried to spin with two or three spindles at once, holding the several threads between the fingers of his left hand, but the horizontal position of the spindles frustrated his attempt. One of his children, however, is said to have upset the spinning wheel while he was at work, and as he retained the thread in his hand, the wheel continued revolving horizontally, and the spindle vertically. The observation of these motions produced the thought, that if a number of spindles were placed upright, and side by side, many threads could be spun at once. Hargreaves now put his idea into practice, and the result was the *jenny*, at which he and his family worked, till the large amount of cotton which they spun having excited suspicion, his fellow-spinners, imbued with strong prejudices against machinery, broke into his house and destroyed his frame. He then removed to Nottingham (1768) where he erected a spinning-mill. Two years later he took out a patent for his machine; and discovering that it was in use by manufacturers in Lancashire without his permission, brought an action for £7,000 damages. Pending the trial, he was offered by a company £3,000 for the use of the jenny, but refused; and it having been proved that he had sold some of his machines before the patent was obtained, it was thereby declared to have been invalidated, and his claim for compensation fell to the ground.

Thus the inventor was but little benefited by his work. Hargreaves continued in business as a yarn manufacturer, in conjunction with a Mr. Jones, with moderate success, till his death, when his share in the mill was bought by his partner for £400. His country never gave Hargreaves any reward for the invention to which so much of its wealth is due; though one of the last acts of Sir Robert Peel as a British minister, was to bestow on the youngest and only surviving daughter of this inventor, £250 from the Royal Bounty Fund.

HARICOT, n. *hăr'ĭkō* [F. *haricot*, small pieces of mutton partly boiled and then fried with vegetables, the beans being so called because they are served up sliced]: the French kidney-bean—the ripe beans of *Phăsĕŏlŭs vulgārĭs*, ord. *Legūmĭnōsæ*, and other species; a kind of ragout of meat and vegetables.

HA'RIKA'RI. See Hara-kiri.

HÄRING, *hā'rĭng*, Wilhelm, better known under the name Wilibald Alexis: 1797, June 23—1871, Sep. 16; b. Breslau: German novelist. He was educated in Berlin, and served as a volunteer in the campaign of 1815. He afterward studied law at Berlin and Breslau, but turned to a literary career. He became known first by his romance *Walladmor* (2d edit. 1823–4), written in consequence of a wager with a friend that he would produce a work which should be mistaken for one of Sir Walter Scott's. The audacious mystification was greedily devoured in Germany as a production of the Scottish novelist. It was translated into various languages, among others into English by Thomas de Quincy (London 1824), whose translation, however, departed so widely from the original, that it hardly deserved the name. Häring wrote several admirable tales, but his chief power was in historical romance. His *Cabants* (6 vols. 1832), is his best work. *Roland von Berlin* (3 vols. 1840); *Der Falsche Waldemar* (3 vols. 1842); *Hans Jürgen und Hans Jochem* (2 vols. 1846); *Der Wärwolf* (3 vols. 1848); and *Ruhe ist die erste Bürgerpflicht* (5 vols 1852), are classed among the best specimens of historical romance in the German Language.

HARÍRÍ, *hâ-rē'rē*, Abu Mohammed al Kasim ben Ali ben Mohammed ben 'Othman (surnamed El Harírí): celebrated Arabic philologist and poet: b. at Bassorah, on the Tigris, 1054-5; d. 1121 or 3; contemporary with the first Crusade. Little is known of his life and circumstances, save that he was the son of a silk-merchant (whence his name Harírí—*harir*, silk). Harírí wrote several valuable grammatical works, and his lyrics are of a high order. But the most famous of his writings, and indeed one of the most famous compositions of all times and countries, is his book entitled *Makamehs* (Sittings). This may be best described as a novel, or a collection of rhymed tales, loosely strung together, the centre of which is always a certain Abu Seid from Seruj, who, witty, clever, amiable, of pleasing manners, well read in sacred and profane lore,

but cunning, unscrupulous, a thorough rogue in fact, turns up under all possible disguises, and in all possible places—sermonizing, poetizing, telling adventures and tales of all kinds—always amusing, and always getting money out of his audience. The brilliancy of imagination and wit displayed in these strange adventures, their striking changes, and dramatic situations, have hardly ever been equalled; but more wonderful still is the poet's power of language. The whole force of the proverbial fulness of expression, spirit, elegance, and grandeur of the Arabic idiom, Harírí has brought to bear on his subject. His work—of which one of the greatest Arabic authorities has said that it deserved to be written in gold—has become the armory as well as the mine of all Arabic writers since his day. Poets and historians, grammarians and lexicographers, look upon the *Makamehs* as the highest source of authority, and next to the Koran, as far at least as language is concerned. His book has been translated either entirely or partially into nearly every Eastern and European tongue, has been the prototype of innumerable imitations, the most successful of which is the one in Hebrew, *Tachkemoni*, by Jehuda Al-Charisi. The first complete edition of the text appeared Calcutta, 1809–14, 3 vols.; another by Caussin de Perceval, Paris, 1818; one much more valuable, chiefly for its commentary by Silvestre de Sacy, appeared in Paris, 1821–2 (re-edited 1847–53.)

The first (Latin) translations in European tongues of single Makamehs were made by Golius (1656) and Schultens (1731, etc.). But the palm for translation is due to Rückert, who, with a power inferior only to that of Harírí himself, has so completely reproduced the spirit and form of the work in German in his *Verwandlungen des Abu Seid b. Scrug* (1826), that the *Makameh* itself has become a favorite form for similar compositions in Germany. English translations, far inferior to the German, were published 1767 by Chapellon, and 1850 by Preston. Munk and De Sacy have rendered portions into French.

HARISCHANDRA: legendary Hindu king of the solar dynasty, descendant of Ikshwáku, and prominent in the legendary history of ancient India. The earliest mention of him is in the *Aitâreya-Brâhmana* (see VEDA). He is represented there as desirous of obtaining a son, and of making a compact with the god Varuna, by which he promised to sacrifice to the god his son, if he granted him one. Varuna acceded to his prayer, and the *Aitâreya-Brâhmana* then proceeds to relate how Harischandra delayed, from time to time, the fulfilment of his part of the compact, until at last he succeeded in finding a substitute for his son in S'unahs'epa, who was sold to him by his father for 100 cows, to be offered in sacrifice to Varuna. Ultimately, however, S'unahs'epa becomes released from his bondage through the intervention of the gods: see S'UNAHS'EPA. According to the epic poem *Mahâbhârata*, Harischandra was a type of munificence and piety, and

after death became elevated to the court of Indra; and some of the Purânas are still more explicit on his wonderful fate. Having given his whole country, his wife and son, and finally himself to Vis'wamâitra, in satisfaction of the demands made by his greedy priest for his assistance at a sacrifice, Harischandra, in consequence of such a pious act, became elevated with his subjects to the paradise of Indra; but having been insidiously misled by Nâráda to boast of his merits, was cast down again. The repentance of his pride, however, arrested his descent, and he and his train paused in mid-air, where his city is popularly believed to be at times still visible.

HARIVAN'SA: Sanskrit epos of some extent, which professes to be part of the Mâhâbhârata, but may be classed more properly with the Purânas. It is occupied chiefly with the adventures of Vishnu, in his incarnation as Krishna, but treats likewise of the creation of the world, of patriarchal and regal dynasties, and other matter contained in Purânas. Although frequently quoted by later writers, it is not a compilation to be much trusted. See PURANA.

HARK, v. or int. *hârk* [Icel. *hark;* Bohem. *hrk*, noise: Ger. *horchen*, to listen]: used generally in the imperative, hear; listen; hearken. HARK BACK, to return to a former scent, or to a line of thought or argument.

HARK, JOSEPH MAXIMILIAN: Moravian clergyman, author, and educator: b. Philadelphia, Pa., 1849, June 4. After graduating at the Moravian College and Theological Seminary, 1870, he was for a number of years pastor of churches of his denomination in Lebanon, Philadelphia, and Lancaster, Pa., being at the same time a correspondent and editorial writer for the *Outlook*, *Sunday School Times*, *Andover Review*, etc. He received the honorary degree of D.D. from Franklin and Marshall College in 1887. He wrote leading articles for several encyclopedias, and in 1893 he became principal of the Moravian Seminary for Young Ladies at Bethlehem, Pa., which was founded in 1749, and is accordingly the oldest girls' school in America. He was one of the founders of the Pennsylvania-German Society, and of the Pennsylvania Chautauqua, of which he was the first chancellor. He was editor and translator of *Chronicon Ephratense*, and author of *The Unity of the Truth in Christianity and Evolution*.

HARKNESS. ALBERT: an American educator; b. in Mendon, Mass., 1822, Oct. 6; d. Providence, R. I., 1907, May 26. He was graduated at Brown University, 1842; taught in the Providence High School, 1842–53; studied in Germany, 1853–55; and became professor of Greek at Brown University in the latter year. He was the author of many well-known text-books in Latin and Greek, including *Harkness-Arnold; First Latin Book; First Greek Book; Cæsar's Gallic War with Notes; Cicero's Orations with Notes and Dictionary*, etc.

HARKNESS, William: an American astronomer; b. 1837; Dec. 17; d. 1903. He served as surgeon in the U. S. army during the civil war; entered the navy, attained the rank of rear-admiral; and was retired, 1899. He was attached to the U. S. Naval Observatory; became professor of mathematics in the navy; attached to the U. S. Hydrographic office, 1867; discovered the theory of the focal curve of achromatic telescopes; designed most of the large instruments for the naval observatory; and was its astronomical director, 1894–99. In 1899 he was retired with the rank of rear-admiral.

HARLAN, *hâr'lan*, John Marshall: lawyer; b. Boyle co., Ky., 1833, June 1. He graduated at Centre College 1850, and the law dept. of Transylvania Univ. 1852; was adjt.gen. of Ky. 1851, and became judge of Franklin co., Ky., 1853. He served two years in the civil war in the Union army (col. 10th Ky. inf.), was attor.gen. of Ky. 1863–67, defeated as republican candidate for gov. 1871, 75, member of the La. commission 1877, and succeeded David Davis as assoc. justice of the U. S. supreme court 1877, Nov. 29.

HARLAN, Iowa, city, county-seat of Shelby County; on the West Nishnabotna river, the Chicago, R. I. & P., the Chicago & N. R.R.'s; about 90 miles west of Des Moines. The chief manufactures are foundry products, agricultural implements, flour, bricks, gasoline engines, and furniture. Its shipping trade is in agricultural products and the manufactures of the city. Pop. (1900) (1910) 2,750.

HARLAND, *hâr'land*, Henry, pseudonym Sidney Luska, Anglo-American novelist: b. St. Petersburg, Russia, 1861, March 1; d. San Remo, Italy, 1905, Dec. 21. He was educated at Harvard and after being in the surrogate's office in New York 1883–6 removed to London, where he edited the *Yellow Book*. He published, *As It Was Written* (1885), a musician's story; *Mrs. Peixada* (1886); *The Land of Love* (1887); *My Uncle Florimond* (1888); *The Yoke of the Thorah* (1887); *Mr. Sonnenschein's Inheritance* (1888); *A Latin-Quarter Courtship*; *Comedies and Errors* (1898); *Cardinal's Snuff-box* (1900); etc., books which have been extensively circulated in both America and England.

HAR'LAND, Marion: see Terhune, Mary Virginia.

HARLAW, *hăr'law*, Battle of: between Scottish Highlanders and Lowlanders, 1411, July 24, was precipitated by a dispute as to the right of succession to the earldom of Ross. Donald, Lord of the Isles, gathering a host of 10,000 Islesmen and Highlanders, marched rapidly southward, leaving havoc and desolation behind him. The rich city of Aberdeen, and the whole country n. of the Tay, seemed within his grasp, when he was encountered by a vastly inferior force of the chivalry and men-at-arms of Mar, Garioch, Buchan, Angus and Mearns, under Alexander Stewart, Earl of Mar, one of the best captains

of the day, familiar in his youth with the usages of Highland warfare, and later distinguished in the wars of France and Flanders. The armies met on the Eve of St. James 1411, at Harlaw, a low table-land on the banks of the Ury, about 18 m. n. w. of Aberdeen. The battle was long and bloody, but the Highlanders were at last driven back. They left two chiefs, Maclean and Macintosh, and more than 900 dead upon the field. The loss on the other side was computed at 500 or 600, among whom were the Constable of Dundee, hereditary bearer of the royal banner, Sir Alexander Irvine of Drum, and other knights, many of the best esquires of Angus and Mearns, nearly all the gentry of Buchan, and Robert Davidson, the provost, and many of the burghers of Aberdeen.

HAR'LEIAN COLLEC'TION. See HARLEY, ROBERT.

HARLEM, *hâr'lĕm:* former town of Westchester co., N. Y., now incorporated with New York city. The name is now applied to the territory n. of 106th St. and between 8th ave. and the East river. The extension of the elevated railroad system has caused it to become thickly settled. See NEW YORK CITY.

HAR'LEM: city in Holland. See HAARLAEM.

HARLEM PLAINS, BATTLE OF, in the Revolutionary War, a conflict 1776, Sep. 16, which followed Howe's occupation of New York and Manhattan Island. On the Harlem Plains or Flats an advance guard of British troops came into contact with a body of Virginian and Connecticut troops commanded respectively by Majors Leitch and Knowlton. In attempting to flank the enemy Knowlton was killed, and by Washington's orders the Americans retreated with a loss of 60 killed and wounded.

HAR'LEM RIV'ER: tidal channel between Long Island Sound and the Hudson river, beginning at the East river opposite Randall's Island, extending n. w. to a short distance above the point where it is crossed by McComb's Dam, when it curves to the n. till it joins Spuyten Duyvil Creek which connects it with the Hudson river; forming a part of the e. boundary of Manhattan Island and, with the creek, separating the island from the main land; length 7 m. It is crossed at Harlem by 6 bridges, is navigable for large vessels the greater part of its extent, and affords a picturesque sail. This entire channel was opened as a ship canal, 1895, June. Its depth at low water is 9 feet, and at high, 15.

HARLEQUIN, n. *hār'lĕ-kwĭn* [F. *arlequin*—from It. *arlecchino;* OF. *hierlekin*, a troop of demons haunting a lonely place, a demon: also said to be derived from Scand. *hellequin* or *hellequina*, the Hell-queen, or the famous *Helia* or *Hell*, goddess of death]: in a *pantomime*, the performer who is dressed in a many-colored tight-fitting suit and carries a talismanic wand. HAR'LEQUINADE, n. *-kwĭnād*, a piece in which harlequin acts the conspicuous part. HARLEQUIN, CLOWN, PANTALOON, and COLUMBINE, the four chief personages in a pantomime. This species

of play is divided into two parts—one, the introduction, or opening; the other, the harlequinade. Both divisions, particularly the opening, were wont to be acted in dumb-show, and at one time the same performers used to play all through the piece; the idea of which was a story of love, interspersed with grotesque elements. At a certain stage of the plot, a fairy was employed to transform the tyrant and his abettor into Clown and Pantaloon and the lovers into Harlequin and Columbine; and the motley quartette were sent away for a period on a tour or chase, the termination of which took place at the will of the good fairy. During this chase, the object of the Clown ought to be the capture of Columbine; but Harlequin, who is provided by the fairy with a magic sword, the loss of which renders him helpless, is usually able to thwart all his designs, and protect his mistress. A symbolical meaning may, no doubt, be found at the bottom of such representations, at least, in many of their parts; but as, in their modern form, they are a jumble of fragments from older scenic entertainments, anything like a consistent scheme is not to be looked for. As to the characters, the prototypes of the clown and harlequin may be traced back to the Roman Atellanæ. The arlecchino (Fr. *arlequin*) of the early Italian dramatic entertainments was a satirist and practical jester of similar type to the modern English clown. As civilization advanced, the character gradually became more refined, then was confined to the ballet, and at last disappeared from the regular stage. He still figures in the improvised plays of the Italians. In English pantomimes, the clown is the prime mover in the 'comic business;' and there are often two, the 'talking' clown, and the 'tumbling' clown. who acts chiefly as an acrobat. The clown is also a never-failing adjunct in circus entertainments. Pantaloon is usually represented as a very senile old man, the butt of the clown, and the aider and abettor of that person's comic villainy. This personage is knocked about and well cuffed by everyone; he generally, therefore, wears a stuffed dress, in order to protect himself from accident. Columbine, lover of Harlequin, has nothing to do all through the piece but to dress well, look pretty, and dance her best: the character is usually represented by a well-trained dancer. Harlequin wears a tight dress sewn over with spangles.

The persons engaged in these occupations require to be trained to it from infancy. To make a good clown or harlequin (in the continental and original sense of the word) requires genius; and though the rôle may seem the lowest in the dramatic art, lasting European reputations have been obtained in it, as by the English clown, Grimaldi and the famous French Carlin (1713–83). See PANTOMIME.

HARLEQUIN DUCK, *hâr'lĭē-kwĭn dŭk* (*Clangula histrionica*): species of Garrot (q.v.), which receives its name from its variegated markings, chiefly white, gray, and black. Its whole length is abt. 17 inches. It inhabits the

arctic regions, where it is found on the sea, and on lakes and rivers. In America, it is plentiful in winter as far s. as the Bay of Fundy.

HARLEY, *hâr'lĭ*, ROBERT, Earl of Oxford and Mortimer: 1661, Dec. 5—1724, May 21; b. London; son of Sir Edward Harley, active partisan of the parliament during the civil wars, descended from an illustrious Herefordshire family. Harley entered parliament, being returned for the Cornish borough of Tregony, as a whig; but soon began to vote and speak against his party; and policy and ambition rather than choice, made him an anti-dissenter and ardent tory. He shortly acquired great reputation for his knowledge of parliamentary law and practice, a study not much pursued in those days; and in the parliament, which met under the chieftainship of Rochester and Godolphin, 1701, Feb., he was, by a large majority, elected speaker. Harley retained this post, twice re-elected, till 1704, when he became sec. of state. The conviction of Harley's sec. for treasonable correspondence with France caused his master, though entirely exculpated, to resign his office 1708, Feb. Harley remained out of power two years, long enough with the assistance of Mrs. Masham, to completely undermine the power of the whigs. In 1710, Aug., Godolphin was dismissed, and Harley was appointed to his post of chancellor of the exchequer, and brought back the tories. An event in 1711, raised Harley to high popularity. A French priest and spy, who assumed the title Marquis de Guischard, being brought before the council Mar. 8, on the charge of treasonable correspondence with France, rushed upon Harley and stabbed him with a penknife. His life was said to have been in danger, and recovering, he was congratulated by parliament on his escape, created Earl of Oxford and Mortimer, decorated with the Garter, and in the following May appointed lord-high treasurer of Great Britain. From this point, Harley's course was downward: he was not a man of business, and was destitute of that indispensable quality for a premier—decision of character. Macaulay had but a mean opinion of Harley as a statesman, though he gives him, as a man, a higher character than could be given to any other politician of the time. The principal act of Harley's administration was the treaty of Utrecht: though England might have obtained better terms, she had nothing to gain from continuance of the war; and the peace was, at all events, popular. Harley ceased to pay court to Lady Masham, and the unscrupulous Bolingbroke, succeeding in getting him dismissed 1714, July 27. Lord Oxford was dismissed on Tuesday—Bolingbroke became premier—and Queen Anne died on Sunday. George I. was proclaimed, and Bolingbroke fled to France, but Oxford remained to meet his fate. He was sent to the Tower, and after two years' imprisonment, brought to trial; the two houses quarrelled as to the mode of precedure, and the commons having in anger refused to take any part in the trial, he was acquitted by the peers, and released. He spent the remainder of his life

in retirement—the friend of scholars and men of letters—the founder of a collection of books, and one of ancient pamphlets and MSS. which perpetuates his name. The collection, 8,000 MSS. and 400,000 pamphlets, was bought by govt. 1723 for £10,000. From these papers several vols. of selections have been published under the title *Harleian Miscellany*.

HARLOT, n. *hâr'lŏt* [W. *herlawd*, a youth; *herlodes*, a damsel—the term originally meant simply a young man: comp. Gael. *ur-laoch*, a young hero or warrior]: a strumpet; a woman of loose character; *figuratively in Script.*, one who forsakes the true God and worships idols. HAR LOTRY, n. *-rĭ*, lewdness; in *OE.*, a name of contempt for a woman. TO PLAY THE HARLOT, to commit lewdness or fornication. *Note.*—In its comparatively modern sense HARLOT is probably nothing more than an easy corruption of *whorelet*, a little whore, the spelling *harlot* having been adopted from its similarity in sound to the OE. word. Some derive the word from Arlotta, the name of the mother of William the Conqueror.

HARM, n. *hârm* [AS. *hearm*, evil, harm: Icel. *harmr*, grief, Sw. and Ger. *harm*, anger, affliction: comp. Gael. *arm*, a weapon]: hurt or injury with an arm or weapon; injury; hurt; damage; moral wrong; mischief; V. to hurt; to injure; to damage. HARM'ING, imp. HARMED, pp. *hârmd*. HARM'FUL, a. *-fûl*, injurious. HARM'FULLY, ad. *-lĭ*. HARM'FULNESS, n. HARM'LESS, a. *-lĕs*, void of harm; inoffensive. HARM'LESSLY, ad. *-lĭ*. HARM'LESSNESS, n. innocence; freedom from tendency to injure or hurt.—SYN. of 'harm, n.'; crime; detriment; injustice; wrong; wickedness; prejudice; evil; loss; misfortune;—of 'harmless': unoffending; innocuous; innocent; unhurt; uninjured; unharmed.

HARMALIN. See HARMIN.

HARMAR, *hâr'mĕr*, JOSIAH: 1753–1813, Aug. 20; b. Philadelphia: soldier. He received a Quaker-school education, entered the continental army as capt. of the 1st Penn. rept. 1776, was promoted lieut.-col. 1777, served with Washington 1778–80 and in the south with Greene 1781–2, was brevetted col. of the 1st U. S. regt. 1783, took the ratification of the definitive treaty of peace to Paris 1784, became lieut.col. of inf. under the confederation 1784, Aug., was brevetted brig.gen. by resolution of congress 1787, was gen.-in-chief of the army 1789–1792, and was adj.gen. of Penn. 1793–99. He was a noted Indian fighter.

HARMATTAN, n. *hâr-măt'tăn* [an Arabic word]: the hot dry wind of Senegambia and Guinea, blowing from the great desert of Africa toward the Atlantic in Dec., Jan., and Feb. It is generally accompanied by a fog, through which the sun appears of pale-red color. It has a hurtful effect on vegetation, and unpleasantly affects the human body, drying up the eyes, nostrils, and mouth, and even causing the skin to peel off. It, however, has the good effect of checking epidemics, and curing dysentery,

fevers, and cutaneous diseases. The Harmattan is the same as the sirocco (q.v.) of Italy.

HARMIN, or HARMINE, n. *hâr'mĭn*, AND HARMALIN, or HARMALINE, n. *hâr'mâ-lĭn* [Sp. *harma*, wild Syrian rue]: two alkaloids, occurring in the husk of the seeds of the *Peganum harmala*, or Syrian rue, which grows in the Mediterranean region and in southern Asia. The seeds are extracted with dilute acetic or sulphuric acid, and the hydrochlorids of the two alkaloids are precipitated by the addition of common salt. The precipitate is washed with salt solution, and afterward with water, in which the hydrochlorids dissolve. The filtrate is clarified by animal charcoal and heated to 140° F. after which ammonia is added. Harmine is precipitated first, and by the continued addition of ammonia the harmaline is thrown down subsequently. Harmine has the formula $C_{13}H_{12}N_2O$. It is practically insoluble in ether, and is but slightly soluble in water. It dissolves in alcohol, from which it crystallizes in colorless monoclinic prisms. Harmaline is the hydrid of harmine, and has the formula $C_{13}H_{14}N_2O$. It is somewhat soluble in water, ether, and cold alcohol, and dissolves freely in hot alcohol. It crystallizes from solution in alcohol in the form of octahedra. The salts of harmine are mostly colorless, while those of harmaline are yellow; under the influence of oxidizing agents the latter are transformed into red coloring matter which is used in the preparation of certain dyes.

The *Peganum harmala* belongs to the nat. ord. *Zygophyllaceæ*. It is a half shrubby plant, with smooth linear pinnate or bipinnate leaves, and solitary white flowers. The seeds are said to possess narcotic properties, and Emperor Solyman is reported to have kept himself intoxicated by eating them. They are used by the Turks as a spice.

HARMODIUS, *hâr-mō'dĭ-ŭs*, AND ARISTOGEITON, *ăr-ĭs-tō-jī'tŏn:* two Athenians strongly attached to each other, who murdered (B.C 514) Hipparchus, younger brother of the 'tyrant' Hippias, for an insult offered by him to the sister of Harmodius. They meant to kill Hippias also, with a view to the overthrow of the Pisistratidæ, but in this they failed. Harmodius was cut down by the body-guard immediately after the murder of Hipparchus. and Aristogeiton fled, but was afterward taken and put to death. As Hippias was banished from Athens a few years later, Harmodius and Aristogeiton naturally came to be regarded as patriotic martyrs, and in this light they appear in all subsequent Greek history. They received divine honors from the Athenians, and had statues raised to their memory. A very beautiful drinking-song on this subject has come down to us in the Greek Scholia.

HAR'MON, JUDSON: American jurist; b. Hamilton County, Ohio, 1846, Feb. 3. He was graduated at Denison University, 1866, and at Cincinnati Law School, 1869. He was judge of the common pleas court (1876–8; judge of the superior court of Cincinnati, 1878–87; and attorney-general of the United States, 1896–7. He is president

of the Ohio Bar Association, and a member of the faculty in the law department of the University of Cincinnati

HARMONIA, a. *hâr-mō′nĭ-ă* [Gr. *harmŏnĭă*, a joining together—from *harmŏzō*, I fit together]: in *anat*, a form of articulation which does not allow motion to the bones.

HARMONIA, *hâr-mō′nĭ-a:* in ancient mythology, wife of Cadmus. She is said, in various modifications of the Theban legends, to have been the daughter of Ares and Aphrodite, of Zeus and Electra, and of Mars and Venus; and sister of Iasion, founder of the mystic rites annually celebrated on the island of Samothrace. On the occasion of her marriage all the gods excepting Juno were present, and among her presents were a rich veil and a splendid necklace that had been made by Vulcan. This necklace, like the moonstone in Wilkie Collins's mysterious novel, brought ill luck to all its owners. Harmonia and her husband were changed into snakes and in that form translated to the Elysian Fields, while the fated necklace passing from one to another generation was the cause of constant evil, Polynices bribed Eriphyle with it to betray her husband Amphiaraus, and the death of Eriphyle's son, Alcmæon, was ascribed to it. It was dedicated to Athena in her temple at Delphi, whence the tyrant Phyallus stole it for his mistress (B.C. 352), who was burned to death in her own house that had been fired by her mad son.

HARMONIC, a. *hâr-mŏn′ĭk*, or HARMON′ICAL, a. *-ĭ-kăl* [L. *harmŏnĭcus*,h armonious: F. *harmonie*, harmony—from L. or Gr. *harmŏnĭă*, a due proportion, as of sounds, harmony—from Gr. *harmŏzō*, I fit together]: relating to harmony or music; musical; consonant; applied to the sounds which accompany the simple tone of any chord or string. HARMON′ICALLY, ad. *-lĭ*. HARMON′ICS, n. plu. *-ĭks*, the doctrine or science of musical sounds; the accompanying secondary notes which emerge when a note is produced on an instrument, as a note struck on a piano. HARMO′NIOUS, a. *-mō′nĭ-ŭs*, sweet to the ear; living in peace and friendship; being in concord; adapted to each other; symmetrical; symphonious; musical. HARMO′NIOUSLY, ad. *-lĭ*. HARMO′NIOUSNESS, n. HARMON′ICON, n. *-mŏn′ĭ′-kŏn*, a musical instrument contrived to imitate the effect of a military band, including the triangle, cymbal, and drum. HARMONIZE, v. *hâr′mō-nīz*, to bring together and reconcile; to adjust in harmony; to agree. HAR′MONIZING, imp. HAR′MONIZED, pp. *-nīzd*. HAR′MONIZER, n. *-zĕr*, one who. HAR′MONIST, n. a musical composer. HAR′MONOM′ETER, n. *-nŏm′ĕ-tĕr* [Gr. *metron*, a measure]: an instrument for measuring the harmonic relations of sounds. HAR′MONY, n. [F. *harmonie*]: *-mō-nĭ*, an agreeable combination of sounds heard at the same time; the just adaptation of parts to each other; concord or agreement; correspondence of sentiment or feeling (see HARMONY, in Music). HARMONIC TRIAD, in *music*, the chord of a note with its third and perfect fifth; the common chord. HARMONIC PROGRESSION, a series of numbers in harmonic proportion (q.v.).

HARMON'ICA [Gr. *harmonĭca*]: musical instrument invented by Benjamin Franklin, the sound of which was produced from glass in the shape of a cup, or half globe, which was put into a revolving motion on its centre, while the rim was touched by the finger. Franklin, in a letter 1762, July 13, to Padre Beccaria, at Turin, mentions the history of his invention. It had already been known that beautiful sounds could be produced by friction of the finger on the rim of an ordinary drinking glass. An Irishman, named Puckeridge, was the first who hit on the idea of playing airs on a row of glasses, which he tuned by putting water into each. He performed publicly in London; but he and his glasses were burned in the great fire in London 1750. When Franklin finished his invention, he found an excellent performer in a Miss Davis, to whom he made a present of his harmonica, and who in 1765, performed on the harmonica in Paris, Vienna, and all the large cities of Germany with great effect. This fascinating instrument found many admirers, but none of them ever succeeded in improving it. The compass of its notes was from C to F, including all the chromatic semitones. The producing of the sound by the points of the fingers produced such an effect on the nerves of the performer as in some instances to cause fainting fits. All attempts to make the harmonica through means of keys, easier for amateurs, ended in failure, as no substance was found to act as a substitute for the human finger. The harmonica gave rise to a host of similar instruments by Chaldini, Kaufmann, Rieffelsen, and others, which were not eminently successful. Other instruments of no merit or importance took the same name, but had no resemblance to the original. The harmonica was somewhat similar to the instrument now known as musical-glasses.

HARMONICA, Chemical: term applied to the musical note evolved when a long dry tube, open at both ends, is held over a jet of burning hydrogen. A rapid current is produced through the tube, which occasions a flickering, and is attended by a series of small explosions that succeed each other so rapidly, and at such regular intervals, as to give rise to a musical note, whose pitch and quality vary with the length, thickness, and diameter of the tube. The explanation of this phenomenon, which was discovered by Lampadius, but long remained unaccounted for, is due to Faraday. A curious modification of the experiment is given by Böttger, 94th vol. of Poggendorff's *Annalen*, 1855.

HARMONICI, n. *hâr-mŏn'ĭ-sī* [Gr. *harmonikos*, harmonical]: the followers of the Pythagorean system of music as opposed to that taught by Aristoxenus; called also Musici. The Aristoxenians viewed music as an art governed by an appeal to the ear; the Pythagoreans as a science founded on physical laws.

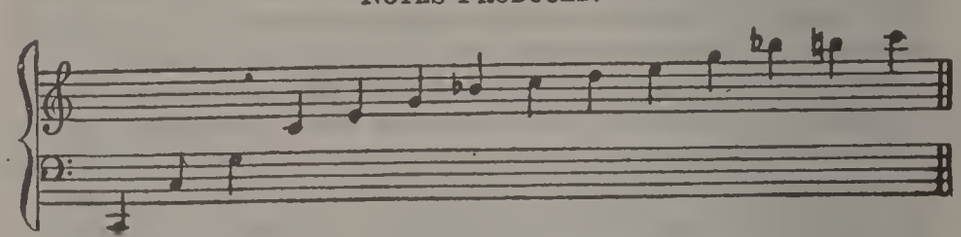
HARMONIC PROPERTIES, in Mathematics: a class of properties of fundamental importance in projective geometry. They are connected with the *harmonic progres-*

sion, which is any sequence of terms a, b, c, ... whose reciprocals $1/a$, $1/b$, $1/c$, are in arithmetic progression. Thus one harmonic series is 1, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$ derived from the arithmetic series 1, 2, 3, 4,... When these numbers a, b=c, are in harmonic progression, b is called the *harmonic mean* of a and c, and is determined by the formula b-$2ac/(a + c)$. The name 'harmonic' is said to be due to the fact, discovered by Pythagoras, that if a vibrating string be stopped at half its length, one-third its length, etc., the pitch of the remainder is the octave, fifth, etc., of the original. For geometric purposes a convenient starting point is the division of a given line A C internally and externally in the same ratio by two points B and D, i.e., so that AB: BC::AD:CD. The line AC is then said to be divided harmonically, and in fact the lengths AB, AC, AD are then in harmonic progression as defined above. It is also true that the line BD is divided by A and C externally and internally in the same ratio. The relation between the two point pairs A, C and B,D is therefore a reciprocal one; each pair is said to be harmonic to the other. If the middle point of AC is M, it is found that $MB.MD = MA^2\ MC^2$. If a circle be drawn through B and D, the chord of contact of the tangents from A will pass through C. By letting A move on the line, all the point pairs A, C harmonic to B, D can be constructed in this way. In place of the circle any conic section through B and D may be employed. The chord of contact of the tangents from A is called the *polar* of A; this polar is therefore the locus of the point C harmonic to A with respect to B, D as the line turns about A. Harmonic division can also be performed by means of straight lines only. On any line through B two points P and O are selected and joined to A and C by straight lines which meet also in R and S. Then the line RS passes through the fourth harmonic point D. The figure, consisting of the six lines joining the four points A, C, R, S, is called a *complete quadrangle*; it has several harmonic properties.

HARMON'ICS: The accessory, or concomitant sounds produced by a fundamental musical sound, either naturally, or by a division into aliquot parts. Every musical sound, though to the ordinary ear it comes only as one sound, will, on close examination, be perceived to consist of a principal or fundamental sound, accompanied by other feeble acute sounds in perfect harmony (see HARMONY). The existence of such accompanying sounds, called harmonics, can be best demonstrated by the vibrations of a string stretched between two points, or bridges. Eight ft. is a good length for such a string, though 16 ft., or even 32, would be better, from bridge to bridge. A scale or measure, accurately dividing the length of the string into aliquot parts, from $\frac{1}{2}$ up to $\frac{1}{16}$, is placed alongside of it. When a violin bow is drawn across the string, it vibrates from end to end, and gives out its fundamental sound. Divide the string into halves by slightly touching it with the finger at the mark $\frac{1}{2}$ on the scale, or better, with a stretched thread lightly

pressed upon it at that point; when sounded, it will be found to vibrate in two halves, each part vibrating as fast again as the entire string, and producing a sound an octave above the fundamental one, or as 2 to 1. Divide in the same manner at $\frac{1}{3}$, and the sound produced is the fifth above the last octave, being in proportion of 3 to 2. It is not necessary to touch the string on more than one of the points of the division, for the long side of the string always divides of itself naturally, which can be seen by the eye. The parts where the string seems at rest, are called the nodal points. Divide as before at $\frac{1}{4}$, and the second octave above the lowest sound is heard, being to the first octave as 4 to 2. At $\frac{1}{5}$ the major third above the last octave it found, being as 5 to 4. At $\frac{1}{6}$ the octave of the former fifth, 3 to 2. At $\frac{1}{7}$ we find the true flat seventh, or 7 to 4; at $\frac{1}{8}$, the octave of the lowest; at $\frac{1}{9}$ the major second, or 9 to 8; and above this, at $\frac{1}{10}$, $\frac{1}{12}$, $\frac{1}{14}$, we find the octaves of the major third, the fifth, and the flat seventh; while at $\frac{1}{15}$ we obtain the sharp seventh, or 15 to 8; and at $\frac{1}{16}$ another octave of the fundamental sound. The following is the order in which the harmonics arise, assuming that the string, at its full length, sounds the note C on the second leger line below the bass staff, or lowest string on a violoncello.

NOTES PRODUCED.



DIVISIONS OF STRING.

1	2	3	4	5	6	7	8	9	10	12	14	15	16
C	C	G	C	E	G	B♭	C	D	E	G	B♭	B♮	C

From these harmonics, the true ratios of all the intervals of the diatonic scale, in relation to a fundamental key-note, are found, and in the most perfect tune; they are as follows:

Degrees of the scale,	I.	II.	III.	IV.	V.	VI.	VII.	VIII.
Notes of the scale,	C	D	E	F	G	A	B	C
Ratios to key-note	1	$\frac{9}{8}$	$\frac{5}{4}$	$\frac{4}{3}$	$\frac{3}{2}$	$\frac{5}{3}$	$\frac{15}{8}$	$\frac{2}{1}$

Assuming 24 as the number of vibrations of C in any given time, the other notes of the scale may be expressed in whole numbers thus:

Notes of the scale,	C	D	E	F	G	A	B	C
In whole numbers,	24	27	30	32	36	40	45	48

In the artificial division of the octave into a chromatic scale of 12 equal semitones, all the intervals must necessarily be made somewhat imperfect, which is called temperament (see TEMPERAMENT). This must be especially attended to in keyed instruments. Singers, and performers on stringed instruments, are guided by their ear, being free from the fetters of fixed notes, to which keyed instruments are necessarily subject. Even in the natural diatonic scales

as produced by the harmonics, it will be found, on analysis, that a certain degree of temperament required to make the fifths within the octave equal. For example, the fifths from F to C, and from E to B, will be found to be accurately the same as the fifth from C to G—viz., $\frac{3}{2}$ which is easily ascertained by reducing their respective numbers to the lowest fraction; thus F to C is $\frac{48}{32}$= to $\frac{3}{2}$; from E to B is $\frac{45}{30}$=$\frac{3}{2}$; while from D to A, which in practical music must also be treated as a fifth, will be found to be too flat; thus D to A is $\frac{40}{27}$, which cannot be reduced to $\frac{3}{2}$; but when both are brought to the fractions of a common denominator, which is done by multiplying $\frac{40}{27}$ by 2=$\frac{80}{54}$, and $\frac{3}{2}$ by 27=$\frac{81}{54}$, it is shown that D to A, in the scale of nature, is flatter than a perfect fifth, in the proportion of 81 to 80 so that without temperament A cannot at the same time be a perfect major sixth to C, as a key-note, and also a perfect fifth to D, the true major second of C.

HAR'MONISTS, also called Rappists and Economites: a religious-socialistic community founded in 1787 by George Rapp (1757–1847), a German of Würtemberg. The peaceable and spiritual tenets of the organization aroused antagonism and persecution, and in 1803 they emigrated to America, settling in the Connoquenessing Valley, where the Harmony Society was established on a working basis. By 1805, houses, churches, mills, and manufactories had been built, and the settlement had a population of 750 persons. In 1815 they removed to Posey County, Ind., where they founded New Harmony; 10 years later, however, they returned to Pennsylvania, and built the township of Economy, in Beaver county, on the Ohio, 20 miles north of Pittsburg. In 1832, a German adventurer, Bernhard Müller, settling among them, caused dissensions and a split in the society; a separation and apportionment of the property was agreed upon, and 250 members retired. They held all property in common, believed in the second coming of Christ, the near advent of the millennium, and practised celibacy. As a result of the latter condition, the membership has been reduced to eight, and the valuable estate will pass finally into the hands of the last survivor. Consult Hinds, *American Communities* (1902); Nordhoff, *The Communistic Societies of the United States* (1874).

HARMO'NIUM: musical wind instrument, keyed like a piano, and producing sounds somewhat like those of an organ, but entirely by means of vibrating metallic tongues. It is a modern invention, for which there are many claimants. The principle by which the sounds of the harmonium are produced, is called the *free vibrating reed*, supposed to have been a modern discovery, but now ascertained to have been known in China long before it was ever heard of in Europe. Its construction is as follows: A narrow rectangular slit being made in a piece of brass-plate of a quarter of an inch in thickness, a thin elastic spring of the same metal, and of nearly the exact breadth of the slit, is fixed at one end by two small rivets to the surface of the

plate, close to one end of the slit, being so adjusted as to fill the area of the slit, and that when pressed into it at the free end, it may pass inward without touching the end or the sides of the slit, and when left to itself it shall return back to its position of covering the slit. The spring at the free end is permanently bent a very little outward. When a current of air is forced through the slit, the spring is put into vibration, and produces a continuous musical sound, acute or grave, according to the rapidity or slowness of the vibrations. This kind of reed is termed 'free,' in contra-distinction to the reed of the organ-pipe, the spring or tongue of which entirely covers an oblong slit, in the side of a brass tube closed at one end, and vibrates against the cheeks or outside of the slit, instead of within it. After many attempts, in various countries, to construct a keyed instrument of really a useful kind with the free reed, Debain of Paris, produced his invention of the harmonium, which became more or less the model of all that have followed. The harmonium occupies comparatively little space, being only about 3 ft. 3 inches high, and 3 ft. 9 inches broad; the depth being according to the number of the stops. It has a compass of five octaves of keys from C to C, the key-board being placed on the top, immediately below the lid. Under the key-board is the wind-box, on which are valves for each key; while below the valves, and inside of the wind-box, the different rows of reeds are placed. The sizes of the reeds differ, according to pitch, from about $3\frac{1}{2}$ inches long to $\frac{1}{2}$ inch; and the quality of sound is affected and modified by the breadth of the vibrating part of the reed, and shape of the aperture in the wind-box covered by the valve. The pressure of wind is from a bellows with two feeders, which the player moves alternately with his feet (or which an assistant may move by a handle), filling a magazine similar to the bellows of a small organ. When a key is pressed down, the valve below it opens, and the wind, which has access from the bellows to the wind-box, rushes through the slit of the reed, and produces a sound which continues while the valve is kept open. It is a peculiarity of the free reed that an increase or a diminution of the pressure of wind does not alter the pitch of the sound, but merely increases or diminishes its volume. Advantage is taken of this peculiarity to effect in the harmonium an expressive swell and diminution in the sound, by gradually increasing or diminishing the pressure of the wind. The vibrations of the spring being like those of a pendulum, isochronous, remain fixed in rapidity or slowness, according to the length and elasticity of the vibrating slip of metal, and thus regulate the pitch of the sound without reference to the pressure of wind. For the deep bass-notes the springs are heavily loaded at the loose end, to make them vibrate slowly; while in the higher notes they are made thinner at that end. Harmoniums are made of various sizes, and from one row of reeds (or vibrators, as they are now called) to four or more rows; each row is divided near the middle, between an E and F; and each half has its separate draw-

stop. Lately, a 'knee' movement, erroneously called a pedal, for producing a small degree of crescendo on either bass or treble, has been attached. Some harmoniums are made with two rows of keys, thus affording a greater variety in playing solo with an accompaniment; and for more skilful performers, pedal-keys for the feet, like those of a church organ are added. The *Seraphine* was a similar but much inferior instrument. The *American Organ*, introduced 1861 by Mason and Hamlin, is a kind of harmonium which acts by wind exhaustion or suction; and instead of force bellows, works by exhaustion bellows. Its tone is softer, and its timbre less reedy; it is also easier to play. But the true harmonium is capable of higher treatment. The *Percussion action* for the harmonium consists of a small hammer like that of a pianoforte, which strikes a blow on the vibrator the moment the key is pressed down, and sets it instantly into vibration, thus assisting the action of the wind. Harmoniums may now be had of almost every size and quality, at prices from a few dollars to many hundreds. Valuable chiefly for accompanying psalmody, they suitably take the place of organs in temporary places of public worship, or for less opulent congregations, though they necessarily lack the pleasing and useful variety as also the majesty and nobleness of tone which makes the organ unrivalled among instruments of music.

HAR'MONY, in Music: understood to be the union of sounds which individually appear different, but when heard together form a collective sound called a chord (see CHORD); or explained as the melting or flowing together of several sounds into, as it were, one sound; in consequence of or arising from the consonant nature of their relative proportions to a fundamental sound. All musical composition can be reduced to a fundamental harmony of successive chords, which, in their progression, are regulated by the rules of the theory of music. Dissonant, as well as consonant, chords are included as forming harmony, as they are a union of several sounds that have but one fundamental sound, or bass note, in common. The harmony of chords can be either close or spread, which the position or distance of the sounds or intervals from one to another, forming the chords, determines. Close harmony is when the sounds composing each chord are placed so near to each other, that no sound belonging to the chord could again be interposed between any of those already present. Spread harmony is when the sounds of a chord are placed at a greater distance from each other, so that some of them might be again interposed between the parts of those sounds already present. Close harmony generally takes place in music in which there exists a near relationship among the different parts, as in compositions for four male voices, in which case it becomes unavoidable, and spread harmony impossible. In choruses for mixed voices, and in instrumental compositions, spread harmony is more used, and the intervals of the chords are frequently

inverted, which produces what is called double counterpoint (q.v.). In the inversion of intervals, great care must be taken to avoid a consecutive progression of such intervals as become fifths by inversion; also that an alto part should never approach nearer a bass part than the distance of an octave. Close and spread harmony are often mixed, in order that individual parts may become more melodious and easier to sing, as well as to prevent unpleasant or abrupt skips in the melody; or to avoid an equally faulty monotonous formality of movement.

Though it has been said above that every chord, whether consonant or dissonant, forms harmony, it must not be understood that any combination of sounds which one may choose to sound together is harmony. A dissonant chord treated as harmony is always judged of according to the nature of its different intervals, of which there are often some that are treated as dissonances, though they are fundamentally consonances, only more or less imperfect. All harmony in music is derived from what are called the aliquot tones. When a string is made to vibrate, we think at first that we hear only one sound; but on closer and more careful observation, we early discover that the fundamental sound, particularly when it is a deep one, is accompanied by others in the most perfect harmony. The accompanying sounds are exactly those of which the chords in music are formed, and on which the foundation of the whole system of harmony in music is laid. From the mathematical proportions and the relations of the accompanying sounds to the fundamental or principal sound from which they all arise (see HARMONICS), it follows that harmony, in its first and natural state, can be only in four parts, and it is then called perfect, or complete, in opposition to harmony of two or three parts which cannot be complete, as some of the intervals of the chords, essential to characterize the key or scale, may be lacking. A four-part harmony may be so arranged that five, or even more parts may appear, by means of doubling one or more of the intervals in the octave. From this increasing of the parts arises what is called the subordinate harmony, accompanying the principal or fundamental. In order to avoid faulty progression in the subordinate harmony, care must be taken to observe strictly the rules which apply to the intervals in their fundamental state. The purpose of the subordinate harmony is only that of ornamenting the original, which the Germans call *figurirung*, commonly called figured harmony, but should be more properly called florid counterpoint. If it be admitted that the intervals and chords most consonant are also most harmonious, it naturally follows that the union of similar sounds must be the most perfect, therefore the order of perfection in which they rank must arise from their mathematical proportions in relation to the fundamental sound or unison. The common chord of a third fifth, and octave to a bass note is the most pure and perfect harmony; after which follow the chord of the seventh

and the chord of the ninth. The inversions of any of these chords are all in various degrees less perfect than their original fundamental harmony. The position of the intervals in respect to the fundamental note is also an element in the purity of chords; as, for example, a chord of the seventh in close harmony, is far less satisfactory and pleasing than it is in spread harmony, where the different intervals are at, or near, their natural distances from the fundamental note. Such considerations are of great importance to the musician, who has to accompany from a figured bass; and also to organ-builders in arranging the composition of mixture-stops. Harmony in modern music, is therefore a succession of chords according to certain laws. In the early ages of the science, the laws of harmony were most arbitrary. Nature presents us with solitary chords, but she does not establish their succession. A collection of chords is not music, any more than a collection of words is a speech. Music, like a discourse, must also have its phrases, periods, punctuation, etc., and all in harmony. Useful works on harmony are those of Mars, Dehn, Schneider, Bannister, Bowman-Weitzmann, Jadassohn, Macfarren, Ouseley, Richter, and Riemann.

HAR'MONY OF THE GOS'PELS: arrangement of the several narratives of the four evangelists to show the points of their agreement as independent writers of the same life of the Lord Jesus. The narratives of the Evangelists, especially of the first three, are in many things close repetitions of each other, and frequently relate the same incidents in words almost identical. In occasional instances, they exhibit seemingly grave discrepancies, whether of facts or of circumstances, one relating an occurrence not noticed by another, or placing an occurrence at a time or in circumstances not easily recognized with the narratives of the other evangelists. At a very early period of Christian literature this difficulty was felt, and for its more complete and easy elucidation, the passages of the several gospels relating to each subject or incident were collected for comparison and mutual illustration. The title under which the earliest compilation of this nature, which dates from the second half of the 2d c., was known was *Diatessaron*, because it consisted of extracts from the *four* evangelists. The author of this compilation was the heretic Titian, and it is remarkable that, to give a color to his own peculiar opinions as to the unreality of the flesh of our Lord, he omitted from his collection the entire history of the birth and childhood of Jesus as related by Matthew and Mark (Eusebius, *Eccl. Hist.* iv. 29). St. Jerome states that a similar harmony was compiled about the same time by Theophilus of Antioch, though no trace of such a work is now discoverable; but in the middle of the following century the celebrated Neo-platonist convert, Ammonius Saccas, undertook a new *Diatessaron*, which formed the basis of the well-known *Ten Indexes*, or canons, of the Harmony of the Gospels, in the Greek texts, by Eusebius, afterward adapted to the Latin text by St. Jerome, and

which continued to be used as a key to the concordance of the gospels by readers both of the Greek and the Latin text, till the 16th c. The canons of Eusebius consist of ten tables. Of these, the first, which contains four columns, exhibits all the passages common to the four gospels; the second, third, and fourth contain three columns, and show the passages found in all of any three of the gospels; the fifth, sixth, seventh, eighth, and ninth are in two columns, and show the passages which occur in any two of the gospels; and the tenth contains the passages found in only one of the gospel narratives. The convenience and utility of such a scheme are at once apparent, and it has led in later times to the numerous and useful compilations, Rom. Cath. as well as Prot. known under the name of synopses of the gospels, the best and most popular of which are enumerated by Tischendorf in the introduction to his own *Synopses Evangelicæ*, p. 9, and foll.

HAR'MONY OF THE SPHERES: a kind of music which many of the ancients supposed to be produced by the motions of the stars and planets. They attributed this music to the various proportionate impressions of the heavenly bodies on one another acting at proper intervals. Kepler wrote a work on the harmonies of the world, particularly of the celestial bodies.

HARMOTOME, n. *hâr'mō-tōm* [Gr. *harmos*, a joint; *tŏmē*, a cutting]: cross-stone, one of the zeolite family, and so called from the joint-like intersection of its rhombic crystals—a silicate of alumina and baryta.

HARMS, *hârmz*, Claus: 1778, May 25—1855, Feb. 1; b. Fahrstedt, S. Ditmarsch: German clergyman and religious writer. In 1797, he went to the gymnasium at Meldorf, and 1799 to the Univ. of Kiel. The rationalism of the time, in which he had been to some extent educated, failed to give him satisfaction; and Schleiermacher's *Reden über die Religion* at last settled his faith. After supporting himself as family tutor, 1802–06, he was appointed Dean of Lundun, N. Ditmarsch, whence he was called, 1816, to Kiel, as archdeacon and afternoon-preacher in the Nicolai-Kirche. Next year, shortly before the tricentenary of the Reformation in Germany, he issued, in defense of Prot. orthodoxy, 95 theses under the title, *Das sind die* 95 *Theses oder Streitsätze Dr. Luther's*. These produced deep impression throughout Germany, and brought him a call to be bishop of the consistory about to be instituted for the Prot. Church of Russia. This, as well as a call, 1834, to succeed Schleiermacher in Trinity Church, Berlin, Harms refused. In 1835, he was made chief pastor and provost in Kiel, but was compelled to resign in consequence of an attack of almost total blindness. The rest of his life was spent in retirement and literary activity. Harms's published works are chiefly sermons, which may be reckoned among the best specimens of modern pulpit eloquence in Germany. Of these, the most famous are his *Winterpostille* (1808, 6te Aufl. 1846) and *Sommerpostille* (1815, 6te Aufl. 1846), to which a new series was added—

Neue Winterpostille (1826) and *Neue Sommerpostille* (1827). On Harms's life may be consulted Dorner's *Blätter der Erinnerung an das Jubiläum von Harms* (1842) and *Harms's Lebenbeschreibung, verfasst von ihm selbst* (1851).

HARMS, *hârms*, LUDWIG: 1808, May 5—1865, Nov. 14; b. Walsrode, Lüneburg, Hanover; Lutheran minister. He was educated in the Univ. of Göttingen, spent several years teaching, became assist. to his father, who was pastor of the Lutheran Church in Hermannsburg, 1844, and by his popular manners, simple preaching, terrific denunciation of every-day sins, and tender concern for his people, produced a remarkable religious awakening. His labors as preacher and pastor resulted in great spiritual as well as temporal benefits, and were confined to Hermannsburg till the death of his father, 1849. He then built a seminary for the training of missionaries, organized his large parish into a home and foreign missionary soc., began sending out missionaries to all parts of the world, erected and sustained mission stations in Asia, Africa, Australia, and America at an expense of about $40,000 per year; founded a great printing establishment in Hermannsburg 1854, and began the publication of a missionary journal and various religious books. He claimed never to have asked any man for anything, and asserted that all the funds given by numerous well-wishers, for carrying on his great work, came to him in direct answer to prayer.

HARMS'WORTH, SIR ALFRED CHARLES WILLIAM: English newspaper proprietor: b. Chapelizod, County Dublin, Ireland, 1865, July 15. He is the principal proprietor of the London *Daily Mail*, and *Evening News*, as well as some 30 other English journals, and equipped the arctic expedition under F. G. Jackson in 1894.

HARNACK, ADOLF, PH.D., D.D., German church historian; b. Dorpat, Livonia, Russia, 1851, May 7. He was educated at Dorpat Univ., became private tutor at Leipzig, 1874, and was appointed prof. extraordinary of church history at Gissen Univ., 1876, ordinary prof. there 1879. and similar prof. at Marburg 1886. He is author of numerous books, tracts, and periodical articles, written from a historico-critical standpoint; published a history of *Gnosticism* (1873), and an edition of the *Apostolic Fathers*, with Gebhardt and Zohn (1876–78); and since 1881 has edited with Schürer the *Theologische Literaturzeitung;* and since 1882, with Gebhardt, *Texte und Untersuchungen zur Geschichte der altchristlichen Literatur.*—His father, THEODOSIUS HARNACK, D.D. (b. St .Petersburg, 1817, Jan. 3), was prof. extraordinary and ordinary of theol. in the universities of Dorpat and Erlangen, retired 1875, and has since published several books and other contributions to religious literature.

HAR'NED, VIRGINIA, American actress: b. Boston 1868. She became a member of a traveling company about 1884, in 1895 appeared as Trilby in P. M. Potter's dramatization of Du Maurier's story, and subsequently took

various rôles, including Alice Rousillon in *Alice of Old Vincennes,* and the title-part in A. W. Pinero's *Iris.* She was married to E. H. Sothern (q.v.) in 1896 and for several years appeared with his company but recently has starred at the head of her own company. In 1906–7 she played *The Love Letter.*

HARNESS, n. *hâr'nĕs* [OF. *harnas,* or F. *harnais;* It. *arnese,* originally the harness and armor of a knight, all manner of harness: Sp. *arnés,* harness, coat of mail; *guarnescer,* to garnish, to adorn; Gael. *airneis,* household stuff, goods; Ger. *harnisch,* armor]: armor; the tackle or fittings of horses when employed in dragging carts, coaches, gigs, etc. The term is also applied to the apparatus in a loom by the operation of which the warp-threads are shifted alternately to form the shed. V. to put on warlike accouterments; to prepare a horse with the necessary fittings for drawing a vehicle; in *OE.,* to defend; to protect. HAR'NESSING, imp. HAR'NESSED, pp. *-nĕst.* HAR'NESSER, n. *-sĕr,* one who.

HARNETT, *hâr'nĕt,* CORNELIUS: 1723, Apr. 30—1781, Apr. 20; b. England (or N. C.); statesman. He acquired a large estate near Wilmington, N. C.; was a member of the provincial assembly of N. C. 1770–71; pres. of the provincial council and acting gov. 1775; member of the provincial congress at Halifax, N. C.. and of the committee to draft a state constitution and bill of rights 1776; member of congress 1777–80, and a signer of the articles of confederation. He was excluded by name from Sir Henry Clinton's offer of pardon, and died in British captivity.

HAROE'RIS, in Egyptian mythology; the elder Horus, son of *Seb,* the Egyptian Saturn, and *Nu,* or Rhea; said to have been born on the second day of the epact. He was the brother, and not the son, of Osiris, from whom he is to be distinguished. In the inscriptions, he is said to be the son of Atum, of Ptah or Vulcan, and Athor or Venus, according to different legends. He was also lord of the South and Nubia, and particularly ruler over the heaven, illuminating the world with the brightness of his eyes. As such, he was identified with the sun and Apollo, and represented as hawk-headed, wearing the crown of the upper and lower world. His name is found also in the Greek dedications to him of the temples of Ombos and Apollinopolis Parva. His connection with the sun is, however, undoubted, as he is made on one inscription a child of the sun, and type of Mentu Ra or Mars. The festival of his eyes, which mythically represented the sun and moon, took place on the 30th Epiphi.—Birch, *Gallery of Antiquities,* I, 36; Wilkinson, *Manners and Customs,* IV. 395.

HAROLD, or HARALD, *hăr'old,* I. (surnamed HAARFAGER or beautiful haired), King of Norway, founder of the old royal dynasty of Norway: abt. 850—abt. 933; son of Halfdan Svarte, a powerful jarl in Norway, noted as the earliest lawgiver of his country. Harold was of the ancient

race of the Ynglings in Sweden. According to the popular saga, Harold was induced to attempt the subjugation of the whole of Norway, through his love to a high-born maiden, Gyda, who declared that she would not be his wife until he was sole king of Norway; and he swore that he would neither cut nor comb his hair till he had subdued all the land to his sway—an oath which he kept. After many years contests with his brother jarls, he finally reduced the whole of the country from Finmarken to the Naze of Norway; and after defeating the last general confederacy of the independent Norwegian chieftains in a naval battle at Hafursfjord, the present Stavangerfjord, he remained sole ruler of the land (872). Previously to his reign, Norway, like the other Scandinavian countries, had been divided into numerous independent districts or tribes, governed by their several kings. Harold replaced all these rulers by jarls of his own, under whom were placed Herser of bailiffs, to whom was committed the charge of seeing that the tax imposed over all the land was faithfully paid. Harold's severity compelled the deposed rulers to seek other homes; and his reign is memorable for the many new settlements made by these exiles. Thus, the Orkneys were settled by the fugitive Ejnar, son of the king's friend, Rognvald, Jarl of More; while another son, Ganger Rolf, who had incurred Harold's anger by repeated acts of piracy, sailed with his followers 876 to France, where he founded the Norman power. Other exiled Norwegian jarls or kings colonized the Hebrides, Shetland, and Faröe Islands, and Iceland whence they continued their customary sea-roving and plunders until these islands, with the exception of Iceland, were subdued by Harold. Although a barbarian, he ruled with a policy in advance of his age, and by his firmness succeeded in suppressing for the time the private warfare and sea-piracy which had prevailed in Norway before his reign; but the dissensions of his numerous sons checked all the good that might have resulted from his measures. To restore concord in his family, he divided his dominions among his children, reserving only the supreme power to himself. He died in 933 at Trondheim, which he had made his capital, and was succeeded by his son, Eric Blodoxa, or the Blood-axe, to whom he had three years before resigned the government.

HAR'OLD, or HAR'ALD III. (surnamed HAARDRAADE, or Stern in Council), King of Norway, abt. 1015–1067; son of Sigurd, chief of Stingarige, and descendant of Harold I. In his boyhood, he was present at the battle of Sticklestad, in which his brother Olaf, surnamed the Saint, King of Norway, was slain; and he afterward sought an asylum at the court of his relative, Jaroslav, Duke of Russia, whose daughter he sought in marriage The rejection of his suit, however, again drove him forth; and having gone to Constantinople, and become captain of the Vaeringjar, or Scandinavian body-guard of the Greek emperors, he experienced many marvellous adventures, which have supplied abundant materials for the narratives of the older sagas and

modern romances of the north. Harold took part in the expedition against the pirates of the Mediterranean, and is said to have visited Jerusalem, where he fought successfully against the Saracens, whom he defeated also in Sicily and Africa in 18 pitched battles. On his return to Constantinople, he drew upon himself the vengeance of the Empress Zoe, whose proffered love he rejected, and with difficulty escaped from the prison into which he had been thrown on pretended charge of treason. Having made his escape, he returned to Russia, married the daughter of Duke Jaroslav, and took her with him to Norway, where his nephew, Magnus (son of St. Olaf), agreed to divide the supreme power with him, in return for a share of his treasures. The death of Magnus 1047 left him sole king of Norway. His unruly spirit would not, however, suffer him to rest; and in opposition to the pledge that he had given his dying nephew, he entered into a war to dethrone Svend, the king of Denmark, on whose crown he had no just claim. Although he was successful in battle against the Danes, he gained no real advantage by the contest; and 1064 he recognized the right of Svend, nephew of Canute to the throne of Denmark, and having concluded a peace, occupied himself for a time with the internal affairs of Norway. In 1066 he landed in England, to aid Tostig against his brother Harold, King of England, and possibly hoping to re-establish the old Scandinavian sovereignty in England; but was slain in battle at Stamfordbridge; and his followers were obliged to retreat to their ships, and sail for Norway, under the command of Olaf, son of the slain monarch.

HAR'OLD I. (surnamed HAREFOOT, probably on account of his swiftness in running), King of England: d. 1040, Mar. 17 (reigned 1035, or 37—1040; illegitimate son of Canute and Alfgiva of Northampton. According to agreement on Canute's second marriage, his son by Emma was to inherit the English as well as the Danish throne; this son, Hardicanute, was, however, in Denmark at the time of his father's death, and being very unpopular with the Danish part of the population in England, lost half of his kingdom. Leofric, Earl of Mercia, led the cause of Harold while the powerful Earl Godwin espoused that of Hardicanute. Civil war was happily averted by a compromise, and the kingdom was divided. Harold received London, with all the provinces n. of the Thames, while the possession of the south was given up to Emma for Hardicanute. Emma fixed her residence at Winchester, and established her authority over her son's share of the partition. In 1037, the thanes and people of Wessex submitted to Harold, and he was crowned king of all England, though it is stated that the Abp. of Canterbury, Egelnoth, at first refused to perform the ceremony or to allow any of his brother-bishops to do so. He died at Oxford.

HAROLD II., King of the English: abt. 1022–1066, Oct. 14 (reigned 1066, Jan. 5—Oct. 14); second son of the powerful Godwin, Earl of Kent. On the death of Edward

the Confessor, the Witenagemôte (q.v.), in the exercise of its rights, set aside the claims of Edgar Atheling, and, ignoring the reputed bequest of the late sovereign in favor of the Duke of Normandy, elected Harold to fill the vacant throne. Duke William immediately asserted his claim, which was supported by Harold's brother Tostig and Harold Hardrade, King of Norway, for the sake of obtaining the duke's assistance to reinstate the former in the government of Northumbria. Tostig and the king of Norway landed on the coast of Yorkshire, and after defeating Morcar and Edwin, Earls of Northumbria and Marcia, advanced to York, but were met by Harold at Stamfordbridge, and totally routed. Three weeks afterward William landed in England; the contending armies met at Senlac (now Battle) about nine m. from Hastings, where Harold's defeat and death made the Duke of Normandy undisputed ruler of England. The character of Harold is presented in very different lights by the English and the Norman writers. Probably both are extreme. On the whole Harold may be deemed to have possessed many of the virtues proper to a ruler.

HAROUN'-AL-RAS'CHID. See HARÚN.

HARP, n. *hârp* [Icel. *harpa;* Dan. *harpe;* Ger. *harfe*, a harp: F. *harpe*, a harp—from *harper*, to seize: mid. L. *harpa*]: a large musical instrument, with strings or wires, which are played on with the fingers—so named from plucking the strings with a hook or the fingers; in *agriculture*, etc., a sifting implement for cleaning grain or screening lime: V. to play on the harp; to bring out a sound from the harp; in *OE.*, to touch any passion; to affect or move. HARP'ING, imp. HARPED, pp. *hârpt.* HARP'ER, n. *-er*, one who; a minstrel. HARP'IST, n. one who plays on or teaches the harp.

HARP, v. *hârp:* to cling persistently to the same subject of talk; to return to an old subject or idea, and dwell on it vexatiously and tediously. HARP'ING, imp.: ADJ. dwelling on continually: N. a continual dwelling on. To HARP ON ONE STRING, to dwell on or treat any subject in a disagreeable and exclusive way.

HARP: musical stringed instrument, much esteemed by the ancients. In Egypt, the figure of the harp is found delineated from the earliest ages in many different forms, some very simple, and others with much taste and ornament: some played on while standing, others while kneeling. The Celtic bards held the harp in the greatest honor. In the Highlands of Scotland the instrument has disappeared, but it is still in use in Wales, and to some extent it lingers in Ireland, where from its former prevalence, it is adopted as a national symbol. The old Franks and Germans punished those severely who injured a harpist in the hand. The harp was used as an accompaniment to the psalms sung by the early Christian congregations. There are three kinds of harps now known—the ordinary Italian harp, strung with two rows of wire-strings, separated by a

double sounding-board; this kind is now little used, being very imperfect. The double harp, or, as it is called, David's harp, is a more useful instrument, in the form of a triangle, with sounding-board and gut-strings; it is always tuned in the principal key of the music, while the strings are altered to suit any modulations out of the key, by pressure of the thumb, or turning the tuning-pins of certain notes. These defects led gradually to the invention of the pedal harp, which has seven pedals, by which each note of the diatonic scale, in all the different octaves, can be made a semitone higher. The compass of the pedal harp is from contra F. to D of the sixth octave above. In order to have the B flat, it must be tuned in the key of E flat. The music for the harp is written in the bass and treble clef, the same as pianoforte music. A celebrated harpist, Hochbrucker, in Donauwörth, invented the pedals 1720; though some say they were invented by J. Paul Velter, Nürnberg, 1730, who at least added the piano and forte pedal. After numerous attempts at further improvements, the harp at length reached a degree of perfection by the invention of the double-action pedal harp by Erard in Paris, which scarcely leaves anything to be desired. By means of Erard's invention, each string can be sharpened twice, each time a semitone; so that the C string may be C flat, its full length, C natural by the first movement of the pedal, and C sharp by the next movement. The double action harp is tuned with all the pedals half-down, and in the key of C natural. In modern days the domestic use of the harp is very limited. The improvements make it manageable, and the tone is confessedly beautiful; but a good instrument is very costly, and the tuning requires almost professional skill. It is however coming into increasing use in orchestration, and without its help the scores of the more recent great masters cannot be completely rendered. It has been introduced with fine effect into some cathedral services.

HARPE, *ârp*, Jean Francois de la: 1739, Nov. 20—1803, Feb. 11; b. Paris. He studied at the Collége d'Harcourt, and led for some time a rather checkered life. In 1762 he published a volume of juvenile poems, and in the following year his tragedy of *Warwick* appeared which brought him fame and money. Excepting the *Lycée*, this is by far the best of his works, though the writing has but little force. Grimm has admirably characterized the play as 'le coup d'essais d'un jeune homme de soixante ans.' La Harpe's three subsequent plays in the same vein, *Timoléon*, *Pharamond*, and *Gustave Wasa*, entirely failed. Later plays, *Melanie*, *Philcotète*, *Coriolan*, were more successful. But his best known works are his critical lectures, delivered both before and after the Revolution, which, published in 12 vols. (1799–1805) as *Lycée ou Cours de Littérature*, long remained a standard of literary criticism. That portion which relates to ancient literature is of little value, and that in which the author treats of contemporary writers is entirely worthless, owing

to the bitterness and pride of the critic. The intervening portion gives a fairly complete critical history of French literature. His *Correspondance Littéraire*, published 1801, by the bitterness of its criticisms, rekindled fierce controversies.

HAR'PER, Charles G., English artist and author: b. 1863. He is one of the best known of English book illustrators, and his own books, mainly lively, entertaining descriptions of pedestrian and bicycle tours in England illustrated by himself, have been popular in the United States as well as in his own country. Among them are: *Some English Sketching Grounds*; *From Paddington to Penzance*; *The Brighton Road*; *The Great North Road*; *The Norwich Road*; *Cycle Rides Around London.*, etc.

HARPER, Ida Husted, American journalist and author b. Fairfield, Ind. She attended the University of Indiana for two years; entered journalism when about 18, conducted a woman's department in the Terre Haute *Saturday Evening Mail* and in the *Firemen's Magazine*, and was a contributor to many papers, including the Cleveland *Leader*, San Francisco *Chronicle*, and Washington *Post*. She was managing editor of the Terre Haute *Daily News*, for a year, has written for the McClure syndicate, and since January 1899 has been on the editorial staff of the New York *Sun*. She was a member of the International Congress of Women in London in 1899, and was appointed chairman of the international press committee for a five years' term. She prepared the Indiana State monograph for the World's Fair at Chicago under the title *Organized Work of Indiana Women*, and has written *Life and Work of Susan B. Anthony* (1898) and *History of Woman Suffrage to the Close of the Nineteenth Century* (1901).

HARPER, John Murdock, Canadian educator: b. Johnstone, Renfrewshire, Scotland, 1845, Feb. 10. He was graduated from Queen's University (Kingston, Ont.), later was appointed superintendent of education for Prince Edward Island, but declined the appointment, and became successively rector of Quebec High School, and inspector of superior schools for the province of Quebec. Among his publications are text-books and various pamphlets.

HAR'PER, Robert Goodloe, ll.d.: 1765–1825, Jan. 15; b. near Fredericksburg, Va.; lawyer. He entered the Revolutionary army when 15 years old, graduated at the College of New Jersey 1785, was admitted to the bar in Charleston 1786, served in the S. C. legislature and congress 1795–1801; attained the rank of maj.gen. in the war 1812–15; married a daughter of Charles Carroll of Carrollton and settled in Baltimore; was U. S. senator from Md. 1815–16, resigning to become a Federalist candidate for vice-pres., and after a trip to Europe 1819–20 applied himself to the promotion of internal improvements and the interests of the American Colonization Society.

HARPER, William Rainey, ph.d., d.d.: educator and author: 1856, July 26—1906, Jan. 10; b. New Concord, O.

He graduated at Muskingum Coll. 1870; was principal of Masonis Coll., Macon, Tenn., 1875–76; tutor in preparatory dept. Denison Univ. 1876–79; principal of same 1879–80; prof. of Hebrew and cognate languages Bapt. Union Theol. Sem. 1879–86; principal Chautauqua Coll. Liberal Arts 1885–91; elected principal of the Chautauqua system 1891; prof. of the Semitic languages at Yale 1886–91; Woolsey prof. of biblical lit. at Yale 1889–91. He was the first pres. of the Univ. of Chicago, and head prof. of Semitic languages and literature there. He was noted for powers as an executive and organizer, and as an exponent of the inductive system of language study; was joint author of *Inductive Latin Method; Inductive Greek Method; Inductive Latin Primer; Hebrew Method and Manual; Elements of Hebrew Syntax; Hebrew Vocabularies; Harper's Elements of Hebrew; Harper and Weidner's New Testament Greek Method; Cæsar's Gallic Wars; Vergil's Æneid,* etc.; also edited the *Old and New Testament Student.*

HARPER, William Saint John, American artist: b. Rhinebeck, N. Y., 1851, Sept. 8. He studied painting at the National Academy of Design, New York, and afterward became pupil of Munkacsy and Bonnat at Paris. He has done much successful work both as a painter and book illustrator, among his works being *Fairy Tale; Autumn; Winter's Veil; An Opera Night; The Beach Patrol; Spring Sunshine; The Silent Snow; Mayflowers;* etc.

HARPER'S FER'RY: town of Jefferson co., W. Va., at junction of Shenandoah and Potomac rivers; on the Baltimore and Ohio railroad; 45 m. n. W. of Washington, 81 m. w. of Baltimore, 97 m. e. of Cumberland: in the basin formed by Maryland, Loudoun, and Bolivar Heights. It is the seat of Storer College for colored youth, and contains several churches and a normal school. Previous to the civil war Harper's Ferry was a beautiful town, commanding magnificent scenery and containing an extensive national armory and arsenal; but it has since lost its attractiveness, except the beauty of its natural surroundings. Pop. 900.

Harper's Ferry came into great prominence in 1859 through the acts of John Brown (q.v.), and was the scene of noteworthy military events during the Civil War. When Virginia seceded, Harper's Ferry was held by Lieut. Roger Jones, with 45 men. On the night of April 18, 1861, a large body of Virginia militia, hastily assembled from the surrounding country, appeared before the place. Jones set fire to the arsenal, destroyed as much public property as possible, and retreated across the Potomac to Hagerstown, Md., and thence to Carlisle, Pa. The Virginia militia occupied the place, and troops were hastened to it from other States of the Confederacy. The Confederate government attached much importance to the place as a strategical point, but it was abandoned by Gen. J. E. Johnson, 1861, June 15, when he heard that Gen. Patterson, marching from Chambersburg, Pa., was threat-

HARPER'S FERRY IN 1865.

ening to cross the Potomac at Williamsport. The place was then occupied by the National forces. When Gen. Lee invaded Maryland early in September 1862, Harper's Ferry was held by Col. Dixon S. Miles with a large garrison, and there were strong outposts at Winchester and Martinsburg. Lee supposed that his presence at Frederick, Md., would cause the evacuation of Harper's Ferry and its outposts, and thus open his communications by way of Shenandoah Valley, but as it was still held by the National forces it became a necessity to dislodge them. On the morning of September 10 he set three columns in motion from Frederick to surround the place and capture its entire garrison. Gen. Jackson, with 14 brigades, marched rapidly over the South Mountain, crossed the Potomac at Williamsport on the 11th, drove the garrison from Martinsburg into Harper's Ferry, and appeared before Bolivar Heights on the 13th, thus investing the place from the west. Gen. McLaws, with 10 brigades, marched through Brownsville Gap, and, after a severe engagement with Col. Thomas H. Ford on the 12th and 13th, drove him from Maryland Heights and into Harper's Ferry. Gen. Walker, with his division, crossed the Potomac at Point of Rocks, 12 miles below Harper's Ferry, and on the 13th seized Loudoun Heights beyond the Shenandoah. Miles was now completely surrounded, the Confederates occupying high ground, commanding his position. Artillery fire was opened from all these points on the 14th, and late in the afternoon Jackson moved upon Bolivar Heights, drove in Miles' skirmish lines, and gained an advantageous position on the left of the Union line. During the night 1,500 Union cavalry crossed from Harper's Ferry to the Maryland side and escaped. During the same night Jackson crossed 10 guns to the right bank of the Shenandoah and established them on a plateau at the foot of Loudoun Heights, enfilading Miles' entire position on Bolivar Heights, Early on the 15th the Confederate guns on Maryland Heights, Loudoun Heights, and in front of Bolivar Heights opened fire, which was responded to for more than an hour, but the direct and plunging flank-fire from the Confederate batteries partially silenced the Union guns and created some disorder in the Union ranks. Jackson had advanced his lines to within 150 yards of the Union works on Bolivar Heights, and was about to assault, when Miles ordered a white flag displayed on his works and directed Gen. Julius White to arrange terms of capitulation, soon after which Miles was mortally wounded by a shell from a battery that had not seen the white flag. The Union loss during the siege was 44 killed and 173 wounded, and the number of prisoners surrendered and paroled 12,520. The Confederates captured 70 guns, 13,000 small arms, 200 wagons, and a large amount of quartermaster and commissary stores. The confederate loss was 41 killed and 247 wounded, the greater part of whom were lost in the engagement on Maryland Heights. The Confederates abandoned Harper's Ferry on the 20th, and it

was again occupied by the Union forces on the 22d. Consult: *Official Records,* Vols. II. and XIX.; Allan, *Army of Northern Virginia in* 1862; The Century Company's *Battles and Leaders of the Civil War,* Vols. I. and II.

HARPIES. See HARPY.

HARPINGS, n. plu. *hâr'pĭngs:* pieces of oak which hold the timbers of the fore-and-aft cant-bodies till a ship is planked.

HARPOCRATES, *hâr-pŏk'ratēz,* in Ancient Mythology: name given by Greek writers to the younger Horus, the hieroglyphical inscriptions calling him *Har pa khrut,* 'Horus the child,' son of Isis: see HORUS. According to the legend, he was a younger son of Osiris and Isis, who having placed an amulet around her neck, gave birth to him at the winter solstice. He is described by Plutarch as lame in the lower limbs when born, to indicate the weak and tender shootings of corn. He is represented as a child, and his finger is placed in his mouth, an action indicative of youth; but mistaken by the Greek and Roman writers for that of silence, of which they made Harpocrates the divinity. The Temple of Edfou or Appollinopolis Magna was dedicated to him, and in the sculptures he symbolizes the sun in the earliest hours of the day. He has generally been considered to be the winter sun, but represents rather the feeble and nascent sun of the later mythology. The lotus, on which he is often depicted sitting, and which was thought to open at sunrise and close at sunset, was particularly sacred to him. His worship was introduced as part of the Isiac cult of Rome, but was driven from the capital in the consulship of Piso and Gabinius: it was very popular in the days of Pliny. Although the name of Harpocrates is not mentioned earlier than Eratosthenes, yet as he mentions it as part of that of an ancient monarch, it was undoubtedly of high antiquity.

HARPOON, n. *hâr-pôn'* [F. *harpon,* primarily a kind of cramp-iron—from *harper,* to seize, to grapple: Dut. *harpœn,* a kind of dart]: a long shafted barbed spear, held by a long cord, used in catching whales and other large cetaceans. V. to strike or kill with a harpoon. HARPOON'ING, imp. HARPOONED', pp. *-pônd'.* HARPOON'ER, n. *-ẽr,* or HAR'POONEER', n. *-ēr',* one who throws the harpoon. HARPOON-ARROW, arrow shot from a bow, used in fishing by the Alaska Esquimaux. HARPOON-FORK, hay-fork consisting of two barbed tines. HARPOON-GUN, gun for discharging a harpoon of any kind, whether the toggle-iron or the bomb-lance. HARPOON-SHUTTLE, long shuttle or needle used in weaving mats of brush employed in construction of dikes and levees. BOMB-HARPOON, explosive harpoon, also called bomb-lance; it may be hurled by hand or discharged from a swivel-gun. ELECTRIC HARPOON, bomb-lance in which an electric fuse fires the charge, the connection being made by means of a wire in the harpoon-line. EXPLOSIVE HARPOON, harpoon in the head of which is carried an explosive agent.

HARPOOT, *hâr-pôt'*, or KHARPUT. town in Turkish Armenia, seat of a mutasarrif (Turkish district gov.); 60 m. n.w. of Diarbekir. It is on the highway to Sivas, on a rocky eminence in a fertile plain watered by the eastern Euphrates. Besides imposing ruins of a castle on the height, it contains an ancient Jacobite church and convent. It has a Catholic Armenian bishop, and is the seat of an important American Prot. mission, with prosperous college and schools. Pop. about 25,000.

HARPORHYNCHUS, *hâr-pō-rĭng'kŭs* [Gr. *harpē*, sickle; *rungchos*, bill]: genus of mocking-thrushes, family *Turdidæ*, sub-family *Miminæ*, of which sub-family all the members are exclusively American: bow-billed thrasher (also called brown thrasher, *H. rufus*) belongs to this genus; it is common to the United States at large; the other species found in the United States are confined to the s.w.—e.g., *H. rufus longirostris*, *H. curvirostris*, *H. cinereus*, *H. redivivus*, *H. crissalis*.

HARP SEAL: most valuable commercially of the seal family; principally found on the coasts of Newfoundland, Greenland, and Labrador, though occasionally seen in the extreme n. of Europe and Asia; named from harp-shaped lines on its back. It is the chief seal sought by Newfoundland fishermen, has a valuable skin, and yields excellent oil.

HARP-SHELL (*Harpa*): genus of gasteropodous mollusks of the whelk family (*Buccinidæ*), having the last whorl of the shell very large, the shell ripped longitudinally, the foot of the animal very large. The species, not very numerous, are found in the seas of warm climates, particularly at the Mauritius. The shells are much prized for their beauty, but must be kept in drawers, and not exposed to light, or their delicate and brilliant colors will fade.

HARPSICHORD, n. *hârp'sĭ-kăwrd* [*harp* 1, and *chord:* OF. *harpechorde*—from *harpe*, a harp; *chorde* or *corde*, a string]: keyed musical instrument, strung with wires; formerly in extensive use, now little known. In shape it was exactly like a grand pianoforte, to which its internal arrangements also were similar. The sound from the strings was produced by a small piece of crow-quill or a piece of hard leather, which projected out of a slip of wood, called the jack, that stood upright between the strings, and was pushed upward by the key till the quill or leather twitched the string, causing a brilliant but somewhat harsh sound, entirely without any means of modification, in respect to loudness or softness. Specimens of the harpsichord, though becoming rare, are still seen in good preservation as articles of vertu or curiosity. Many Italian and Dutch harpsichords were highly ornamented by eminent artists with valuable oil-paintings on the inside of the lid. The date of the invention of the harpsichord is uncertain Before the 15th c., there is no trace of its existence: it was introduced into England early in the 17th c. In the 18th c., Kirkman, and later Broadwood and Schudi, were the

famous makers in London. After the invention of the pianoforte, of which it is the original, the harpsichord and all instruments of its kind, such as the spinet, were superseded. See PIANOFORTE.

HARPY, n. *hâr'pĭ*, HAR'PIES, n. plu. *-pĭz* [F. *harpie*, a harpy: L. *harpy'iæ;* Gr. *harpŭĭai*, the spoilers, the harpies—from *harpazō*, I seize, I ravage]: in Greek mythology, winged monster, considered as a minister of the vengeance of the gods. Various accounts are given of the numbers and parentage of the Harpies. Homer mentions but one, Hesiod enumerates two—Aëllo and Okypete, daughters of Thaumas the Oceanid Electra, fair-haired and winged maidens, very swift of flight. Three are sometimes recognized by later writers, who call them variously daughters of Poseidon or of Typhon, and describe them as hideous monsters with wings and sharp claws, of fierce and loathsome aspect, with their faces pale with hunger, living in an atmosphere of filth and stench, and contaminating everything that they approached. The most celebrated tradition regarding the Harpies is connected with the blind Phineus, whose meals they carried off as soon as they were spread for him; a plague from which he was delivered by the Argonauts, on his engaging to join in their quest. The Boreads Zetes and Calais attacked the Harpies, but spared their lives on their promising to cease from molesting Phineus. A harpy in heraldry is represented as a vulture with the head and breast of a woman. The name is figuratively applied to a plunderer or extortioner.

HARPY, *hâr'pĭ* [from the harpy of anc. myth]: name given to some of the *Falconidæ*, as the Marsh Harrier (see HARRIER) of Europe, and the Harpy or Harrier Eagle of S. America (*Harpyia destructor* or *Thrasaëtus harpyia*), inhabitant of the great tropical forests, where it preys chiefly on quadrupeds, and to a large extent on sloths and young deer. Of all birds, it has the most terrific beak and talons. It is larger than the common eagle; is short-winged and short-legged; the upper mandible greatly hooked; the feathers of the head capable of being erected into a great ruff and crest. It has not so elegant a form as the true eagles, but is probably equal to any of them in strength and courage. When adult, it is generally of blackish slate-color, with grey head and white breast and belly. It makes its nest in trees. Wonderful stories are told of the fierceness of this bird. As yet it is little known by scientific students. Its affinities are undetermined, whether with eagles, buzzards, or hawks; though the probability seems to be with the eagles.

HAR'QUEBUSS, or HAR'QUEBUS, or HAR'QUEBUSE. See ARQUEBUS.

HAR'RADEN, BEATRICE, English novelist: b. Hampstead, London, 1864, Jan. 24. She took her degree at London University at 21, and subsequently traveled extensively in the United States and on the Continent. Her

first novel, *Ships that Pass in the Night* (1893), was instantly successful and was widely circulated. It has been followed by *In Varying Moods* (1894); *Hilda Strafford*, a Californian story (1897); *The Fowler* (1899), *Katharine Frensham* (1902); etc.

HARRIDAN, n. *hăr'rĭ-dăn* [Dut. *schaerde;* Wall. *hard*, or *har*, a breach or nick: the union of the simple elements, *har*, breach, and *dain*, tooth: comp. OF. *haridelle*, a lean, ill-favored jade: comp. Sp. *haragan*, an idler, a lounger]: an ill-tempered, ugly old woman; a decayed or worn-out strumpet.

HARRIED. See under HARRY.

HARRIER, n. *hăr'rĭ-er* [from *hare*]: variety of dog used for hare-hunting, whence its name; probably of the same origin with the foxhound (q.v.)—from which it differs chiefly in its smaller size—or perhaps derived partly from the beagle. It does not exceed 18 inches in height at the shoulder, but otherwise greatly resembles the foxhound, even in colors, though it is not so swift. Its scent is extremely keen, which enables it to follow all the doublings of the hare.

HARRIER [see HARRY], (*Circus*): genus of *Falconidæ*, allied to buzzards (q.v.), but differing from them in the more slender form of the body, longer and more slender legs, longer wings and tail, and in having the feathers around the eyes placed radiating, somewhat as in owls, a peculiarity which distinguishes them from all other falconidæ. They are remarkable for their low flight, skimming along the ground in pursuit of small quadrupeds, reptiles, etc. The MARSH HARRIER (*C. æruginosus*) called also the MOOR BUZZARD, and sometimes the HARPY and the DUCK HAWK, is a species about 21–23 inches long. The head of the adult male is yellowish white.—The HEN HARRIER (*C. cyaneus*) named from its depredations in poultry yards is 18 or 20 inches long, the adult male of almost uniform gray color, the female brown. The female is known as the RINGTAIL, from a rust-colored ring formed by the tips of the tail-feathers. The male of the HEN HARRIER is called in Scotland the *Blue Hawk.*

HAR'RI-KAR'I. See HARA-KIRI.

HARRIMAN: city, Roane co., Tenn., on the E. Tenn. Va. and Ga. railroad and the Cincinnati Southern railway, and on Emory river. It is a mining and manufacturing centre, coal and iron-ore being plentiful in the vicinity. Chief industries are manufactures of hardware, tools, and agricultural implements. Rolling mills and foundry and machine shops, also lumbering and brick-making, thrive. There are public schools, a national bank, an exposition hall, and several hotels. Harriman has an electric-lighting plant and belt railroad line. One daily and one weekly paper are published. Prohibition of the liquor traffic was included in the original title-deeds of the whole townsite. Pop. (1910) 3,061.

HARRIMAN ALASKA EXPEDITION, an American scientific and artistic expedition which visited the southern coast of Alaska during the summer of 1899. The party was organized by Edward H. Harriman, and consisted of the members of his own family, a few friends, and 50 gentlemen interested in science, art and literature. Among them were Messrs. Henry Gannett, W. H. Dall, C. H. Merriam, R. Ridgway, G. K. Gilbert and F. V. Calville of Washington; D. G. Elliot of Chicago; William Trelease of St. Louis; John Muir and W. E. Ritter of California, and several professors from Eastern institutions of learning. Messrs. John Burroughs, Swain Gifford and F. S. Dellenbaugh represented the literary and artistic contingent. These gentlemen made good use of their opportunities in investigating the geography, geology, glacial phenomena, and fauna and flora of the region visited.

The results were over 300 species and sub-species of animals and plants, records of observations of 22 living glaciers, those which discharge icebergs directly into the sea, and of 100 dead glaciers, those whose fronts do not reach the sea. A new chart was made of the part of the coast explored. Some of the new animal species found are of two foxes, five species and sub-species of shrews, five of hares, one crab, a shrimp, and 25 sea-worms. One of the sea-worms is about six feet long and of a deep vermilion color; another about the same size is blood-red with a white head. In no other part of the world have been found sea-worms of such varied and striking forms and colors. Among the plants found were a large number of new species and sub-species. Each department of science was represented by one or more experts who made critical observations and accurate reports. Consult: *Reports of the Harriman Alaska Expedition; The World's Work* (1900); *Discoveries in our Arctic Region.*

HARRIMAN FIORD, on the southern coast of Alaska, at about lat. 61° N. and long. 145° W., is an arm of Prince William Sound, 15 miles in length. This fiord was discovered by the Harriman Alaska Expedition in 1899. The finding of this fiord is described by John Burroughs, a member of the expedition, as follows: 'Later in the afternoon we ascended an arm of Port Wells more to the westward and entered upon a voyage of discovery. We steamed up to a glacier of prodigious size that reared its front across the head of the inlet and barred further progress in that direction—the Barry Glacier. According to the United States Coast Survey map we were at the end of navigation in these waters; but we went on under a good head of steam down this new inlet where no ship had ever before passed. Glaciers hung on the steep mountain sides all about us. One of these was self-named the Serpentine by reason of its winding course down from its hidden sources in the mountains—a great white serpent with its jaws set with glittering fangs at the sea. Another was self-named the Stairway, as it came down in regular terraces or benches. As we neared the front of the glacier the moun-

tains to the left again parted and opened another new arm of the sea, with more glaciers tumbling in mute sublimity from the heights, or rearing colossal palisades across our front. Another ten-mile course brought us to the head of this inlet, which was indeed the end of navigation in this direction. Subsequently this inlet was fitly named the Harriman Fiord, and the glacier at the head of it, Harriman Glacier.'

HARRINGTON, *hăr'ĭng-ton*, James: 1611, Jan.—1677, Sept. 11; b. Northamptonshire: English political writer. He studied at Oxford, and then visited the continent. On the breaking out of the civil war, he took part with the parliament, and 1646 was appointed by the parliamentary commissioners one of the personal attendants of the monarch. After the execution of Charles, he withdrew from public notice, and devoted himself to the elaboration and completion of his political system. The result was his famous *Oceana*. Eventually he became hopelessly insane. He died at Westminster. An edition of his writings was published by Toland 1700, and a more complete one by Dr. Birch 1737. The best ed. is probably that by Hollis (with Toland's life) 1771.

HAR'RINGTON, Mark Walrod, American astronomer: b. in Sycamore, Ill., 1848, Aug. 18. He was educated at the University of Michigan, and in 1870–1 assisted in the United States Coast and Geodetic Survey of Alaska. He was professor of astronomy and director of the observatory at the University of Michigan, 1870–91. In 1884 he established the *American Meteorological Journal* and was its managing editor until 1892. In 1891 he became chief of the Weather Bureau at Washington, D. C., which post he held until 1895, and was president of the Washington State University 1895–7.

HARRIOT, Thomas, English mathematician: b. Oxford 1560; d. London, 1621, July 2. He entered St. Mary's Hall, Oxford, and was graduated in 1580. In 1585 he was sent by Sir Walter Raleigh as surveyor on the Grenville expedition to Virginia, and on his return he published an account of Virginia, later printed in Halluyt's *Voyages*. He gained the favor of the Earl of Northumberland, who gave him an annual pension, and thereafter devoted himself entirely to mathematical and scientific research. His chief work, *Artis Analyticæ Praxis ad Equationes Algebraicas Resolvendas*, published in 1631, embodied the most important results of his mathematical work. He practically gave to algebra its modern form, improving the notation, being the first to equate all the terms of an equation to zero, and announcing the principle that every equation has as many roots as its dimension. He also did important work in astronomy.

HAR'RIS, *hăr'ĭ*, Amanda Bartlett, American writer: b. Warner, N. H., 1824, Aug. 15. She is a popular writer for young people and has published: *How We Went Bird-Nesting* (1880); *Wild Flowers and Where They Grow* (1882);

American Authors for Young Folks (1887); *The Luck of Edenhall* (1888); etc.

HARRIS, Elisha, M.D.: 1824, Mar. 4—1884, Jan. 31; b. Westminster, Vt., physician. He graduated at the College of Physicians and Surgeons of New York 1849, began practicing in that city, became supt. and physician-in-chief of the quarantine hospital and constructed a floating hospital 1855, was an original member of the U. S. Sanitary Commission, aided in organizing the Metropolitan Board of Health in New York, and became sanitary supt. of New York 1868. He was delegated to the International Medical Congress of the American Public Health Assoc. 1876, pres. of the assoc. 1878, and was sec. of the State Board of Health from 1880 till his death. Dr. Harris invented the railroad ambulance adopted by the Russian govt. for its army, and energetically promoted tenement-house reform in New York.

HARRIS, George, D.D.: theologian: b. East Machias, Me., 1844, Apr. 1. He graduated at Amherst College 1866, and Andover Theol. Seminary 1869, was pastor of the Congl. Church at Auburn Me., 1869–72 and at Providence, R. I., 1872–83, and in the latter year became Abbot prof. of Christian theol. in the Andover Theol. Seminary; became president of Amherst College, 1899. He was one of the editors of the *Andover Review*, 1884–93. Among his works are *Moral Evolution* (1896); *Inequality and Progress* (1897).

HAR'RIS, Howell: 1714–1773, July 21; b. Trevecca, Wales: evangelist. After completing his studies at Oxford Univ., he became an open-air preacher in Wales organized 300 religious societies, received the co-operation of Wesley and Whitefield, founded Calvinistic Methodism in Wales, raised and commanded a regt. of his own people during the French war, and had wonderful success as a preacher, though never ordained as a pastor.

HAR'RIS, James: English philologist and logician: 1709, July 20—1780, Dec.; eldest son of James H., of Close, Salisbury, and of Lady Elizabeth Ashley Cooper, sister of Lord Shaftesbury, author of the *Characteristics*. He was educated at Salisbury, and Wadham College, Oxford, and studied law; but his father having died 1734, leaving him a large estate, he gave his whole time, for 14 years, to the study of his favorite Greek and Latin authors. His first son, became the first Earl of Malmesbury. In 1761, he was returned to parliament for Christchurch, which seat he retained until his death. In 1762, he was appointed a lord of the admiralty, and the next year, lord of the treasury, and 1774, sec. and comptroller to the queen. He is known as the author of *Hermes, or a Philosophical Inquiry concerning Language and Universal Grammar*, a work of great erudition, published 1751. 'It is written', says Coleridge, 'with the precision of Aristotle and the elegance of Quintilian.' He had previously published three treatises—*On Art; On Music, Painting, and*

Poetry; and *On Happiness.* In 1775 appeared his essay *On Philosophical Arrangements,* part of a large projected work on the Logical System of Aristotle. His last work, entitled *Philological Inquiries* (1780), consists of a series of criticisms and comments on the principal ancient, mediæval, and modern authors. His works, with Life by his son, and Earl Malmesbury, were published, London 1801.

HAR'RIS, Joel Chandler: dialectic author: b. Eatonton, Ga., 1848, Dec. 8. He learned the printer's trade studied and practiced law, became an editor of the Atlanta *Constitution;* and beside numerous contributions in prose and verse to the newspaper and magazine press published *Uncle Remus, His Songs and His Sayings: the Folk Lore of the old Plantation* (New York, 1880); *Nights with Uncle Remus* (1883); *Mingo and other Sketches* (1883); *Daddy Jake, the Runaway* (1889); *Free Joe and Other Stories* (1887); *Balaam and his Master* (1890); *Mr. Rabbit at Home* (1895); *The Story of Aaron* (1896); *Stories of Georgia History* (1897); *Sister Jane,* a novel (1897); *Minervy Ann* (1899); *On the Wing of Occasion* (1900); *Georgia, From the Invasion of DeSoto to Recent Times; Evening Tales; The Making of a Statesman; Gabriel Tolliver; Walley Wanderson; A Little Union Scout; The Tar Baby Story and other Rhymes of Uncle Remus; Told by Uncle Remus* (1905); etc.

HAR'RIS, John, D.D.: 1802, Mar. 8—1856, Dec. 21; b. Ugborough, Devon, England: theologian. He was educated at Hoxton College, ordained an independent minister at Epsom 1827, became pres, of Cheshunt College 1837, and principal and prof. of theol. in New College, near London, 1850. His published works, which had large circulation, include the prize essays *Mammon* (1836), and *The Great Commission* (1842); and *The Great Teacher* (1835), *Britannia* (1837), *Pre-Adamite Earth* (1847), *Man Primeval* (1849), and *Patriarchy* (1855).

HARRIS, Joseph, American agricultural writer: b. Shrewsbury, England, 1828; d. 1892. He began his scientific study of agriculture with Lawes and Gilbert at Rothamsted and in 1864 emigrated to the United States, and began to contribute to the agricultural press. His *Walks and Talks on the Farm* was a series of articles which appeared partly in the *Genesee Farmer,* and partly in the *American Agriculturalist,* in which the former had become merged. Among his other writings are: *Harris on the Pig* (1888); *Talks on Manures* (1883); and *Gardening for Young and Old* (1882).

HARRIS, Miriam Coles, American novelist: b. Dosoris, L. I. 1834, July 7. She was married to Sidney S. Harris in 1864 and has since lived in New York. She wrote: *Rutledge* (1860); *The Sutherlands* (1862); both widely read, and among many later and almost equally popular works of hers are: *A Perfect Adonis* (1875); *Missy* (1800); *An Utter Failure* (1891); *A Chit of Sixteen;*

Roundhearts; Rosary for Lent; A Corner of Spain (1898); etc.

HAR'RIS, SAMUEL, D.D., LL.D.: Congl. theologian: b. East Machias, Me., 1814, June 14; d. Litchfield, Conn. 1899, June 25. He graduated at Bowdoin College 1833, and Andover Theol. Seminary 1838, and was principal of Limerick (Me.) Acad. 1833–4, Washington Acad., East Machias, 1834–5, 1838–41; pastor of the Congl. Church, Conway, Mass. 1841–51; at Pittsfield, Mass. 1851–55, prof. of systematic theol. in the Bangor Theol. Seminary 1855–67, pres. of Bowdoin College 1867–71; and in 1871 was appointed Dwight prof. of systematic theol. in Yale Univ. He received the degree D.D. from Williams College 1855, and LL.D. from Bowdoin College 1871, and published among other works *Zaccheus; or the Scriptural Plan of Beneficence* (1844); *Christ's Prayer for the Death of His Redeemed* (1863); *The Kingdom of Christ on Earth* (1874); *The Philosophical Basis of Theism* (1883); *God, Creator and Lord of All* (1897); etc.

HARRIS, THADDEUS WILLIAM, American naturalist: b. Dorchester, Mass., 1795, Nov. 12; d. Cambridge, Mass., 1856, Jan. 16. He was graduated at Harvard College in 1815, studied medicine and practiced his profession in Milton, Mass., until appointed librarian of Harvard in 1831. This position he occupied until his death. Early in life he exhibited a fondness for natural history, and though plodding alone, attained to a scientific eminence which secured for him the fellowship of all the principal learned societies of America, and of many abroad. For several years he gave instruction in botany and general natural history in the college, and originated the Harvard natural history society for the students. He was chiefly distinguished, however, as an entomologist, and has been surpassed as such by no one in the United States. He was one of the founders of the Massachusetts Horticultural Society. In 1837 he was appointed one of the commissioners for a zoological and botanical survey of Massachusetts, the result of which was his *Systematic Catalogue of the Insects of Massachusetts* (1832), in which 2,350 species are enumerated. He also published: *A Treatise on some of the Insects of New England which are Injurious to Vegetation* (1842), a work of permanent value.

HAR'RIS, THOMAS LAKE: founder of 'The Brotherhood of the New Life': b. Fenny Stratford, England, 1823, May 15. While a child he removed with his parents to Utica, N. Y.; began writing for the press and composing verses at an early age; became a Universalist minister and pastor of the Fourth Universalist Soc. of New York; organized an Independent Christian Soc. and preached to it till 1850, when he became a Spiritualist. He then spent 5 years lecturing on Spiritualism through the United States, and established a newspaper and several societies, lectured in the leading cities of Great Britain and won many adherents to his belief 1858–61, and on his return settled with his followers on a farm at Wassaic, Dutchess Co.,

N. Y. The increase of members soon made more ground necessary; several large farms were bought in and near Brocton, Chautauqua Co., N. Y., and the entire establishment was removed thither 1867. About the same time the community was partially reorganized and given its present name, and in 1875 a declaration and explanation of its principles were first published. The 'Brotherhood' is a co-operative but not communistic body, repudiates proselytism, hold sacred the Scriptures and the marriage relation, is without a written form of govt., observes a belief in which the principles of Plato, Swedenborg, and Fourier are combined, keeps every 5th day as one of rest from labor, exacts even justice from its members, and pursues a systematic course of agricultural and industrial labor. Harris has published many prose and poetical works descriptive of the philosophy of 'The Brotherhood' including *Wisdom of Angels* (1856); *Arcana of Christianity* (1857); *Modern Spiritualism* (1860); *God's Breath in Man* (1891); etc.

HAR'RIS, Townsend: 1803–1878, Feb. 25; b. Sandy Hill, Washington co., N. Y.: merchant. He removed to New York 1817, was brought up in the drug business, and became the head of a large importing house. In the early part of his business career he began to take an active interest in the public school system. He was elected successively a school trustee, a member of the board of education, and twice its pres.; and 1847 secured a charter for the Free Acad., afterward the College of the City of New York, organized 1848. In the latter year he started on a long voyage of business and pleasure to the s. Pacific; 1854 was appointed U. S. consul at Ningpo, China; 1856 negotiated a treaty between the United States and Siam; 1856–61 was U. S. consul-gen. in Japan; and completed diplomatically the works of Com. Perry, securing the first treaty of trade and commerce 1858, and the opening of 3 ports to foreign residents 1859. Returning to the United States he resumed his residence in New York, and remained there till his death. He was an incorporator of the American Soc. for the Prevention of Cruelty to Animals 1866, and of the American Museum of Natural History (in Central Park) 1869.

HARRIS, William Torrey: educator and metaphysician: b. North Killingly, Conn., 1835, Sept. 10. After receiving a preliminary education in the local schools he entered the class of 1858 at Yale College, and pursued the course for two and a half years, but did not graduate; in 1869 he received from Yale the degree of A.M., and that of LL.D. in 1895; he also received from Brown Univ., 1893, PH.D.; from Univ. of Jena, 1899, PH.D., and LL.D. from the Univ. of the State of Missouri, 1870, Univ. of Pennsylvania, 1894, and from Princeton, 1896; he taught in the public schools of the city of St. Louis from 1857–67, and was supt. of the schools of that city from 1867–80, when he resigned because of failing health, and removing to Concord, Mass., aided in founding the famous School

of Philosophy, in which he lectured on metaphysical themes; previous to this, in 1878, he had been tendered the honorary title of Officer de l' Academie at the Paris Exposition, 1878, and in 1880 he represented the U. S. Bureau of Education at the International Congress of Educators, Brussels; in 1889, at the Paris Exposition, he received from the French govt. the title of Officier de l'Instruction Publique. During his residence in St. Louis established in that city the *Journal of Speculative Philosophy* (1867), which he still edits; he was also editor-in-chief of a series of school readers, and of the Appleton Education Series; he edited the department of Philosophy in Johnson's Cyclopedia, and wrote many of the articles; in 1900 he became editor-in-chief of Webster's International Dictionary; in 1889 he received the appointment of U. S. Commissioner of Education, a position which he continued to fill until 1906, when he resigned. Among his principal publications are the following: *Introduction to the Study of Philosophy* (1889); *The Spiritual Sense of Dante's Divina Commedia* (1889); *Hegel's Logic, a Book on the Genesis of the Categories of the Mind* (1890); *Psychologic Foundation of Education* (1898); etc.

HARRISBURG, *hăr'ĭs-bĕrg:* city, cap. of Dauphin co., and of the state of Penn.; on the Susquehanna river, the Cumberland Valley, Northern Central, Penn., Philadelphia and Reading, and the Southern Penn. Railroads, and the Penn. canal; 60 m. above the mouth of the river, 105 m. w. by n. of Philadelphia, 126 m. n. of Washington. The river at this point is 1 m. wide has an island in the middle, and is spanned by railroad, foot, and carriage bridges. Proximity to the great coal and iron regions of Penn., and exceptional transportation facilities, have attracted large capital to Harrisburg and given it wide fame as a manufacturing city. Recent statistics report 446 mfg. establishments, using a capital of $8,749,516, employing 7,862 hands, paying $2,949,544 in wages, and yielding products valued at $16,064,597; the industries comprise blast furnaces; rolling, saw, planing, and flour mills; Bessemer-steel works; boiler, machine, galvanized-iron cornice, railroad-car, steel-barrow, and marbleized-slate shops; hydraulic-cement pipe, carriage, coffin, cotton, and tile factories; and numerous smaller but important interests. The principal building, replacing a structure erected in 1822 and destroyed by fire in 1896, is the new state capitol, a classic renaissance edifice in Vermont granite 520 ft. long, maximum breadth 254 ft., height to top of the heroic-gilded statue symbolic of the commonwealth surmounting the massive dome 272 ft.; cost $13,000,000. It stands on an elevation in a beautifully laid out and wooded park of 15 acres, embellished with fountains and monuments. The State Library here, founded in 1790, contains over 100,000 volumes. In State Street stands the Dauphin County soldiers' monument, 110 feet high, in memory of the soldiers who died in the Civil War. There is also a statue here of Gen. John

F. Hartranft, and a monument erected to the memory of the soldiers who fell in the Mexican War adorns the Capitol Park. Among other points of interest are the State Arsenal, the court-house, lunatic asylum, executive building, post-office, Harris Park, and Harrisburg Cemetery. The educational institutions include the high school, Harrisburg academy, St. Genevieve's academy, and the Young Ladies' Seminary. Harrisburg is the seat of a Roman Catholic bishop, and its charitable organizations include several hospitals, the Home of the Friendless, and the Children's Industrial Home. Harrisburg has four national banks and a dozen other banking institutions and building and loan associations. The assessed property valuation is $26,000,000, the tax rate of course constantly changing. The municipal income amounts to $600,000 and the expenditure to $530,000. The principal items of expense are: Fire department, $15,000; waterworks, $30,000; street lighting, $30,000; police, $35,000; schools, $185,000. Public improvements involving an expenditure of $1,000,000 were begun in 1902 for the development of a new sewer system, water filtration, park development and street paving. The city government is vested in a mayor, elected every three years, with no second term, and a bicameral and select council. The highway commissioner, police officials, building inspector, fire department and sanitary officers are elected by the select council. The city solicitor, board of tax revision and appeals, water commissioners, city engineer, city clerk, 3 members of the board of public works and 5 members of the board of park commissioners, are selected by the common council. The treasurer, controller, school directors, supervisors and assessors are elected by vote of the citizens. The site was settled by John Harris about 1726, and in 1733 he was in possession of 800 acres of land and a profitable Indian trading business. In 1755 the place became known as Harris's Ferry because of the ferry across the Susquehanna river established by John Harris, Jr., under a grant by the Penns; in 1785 it was laid out as a town and named Louisbourg in honor of Louis XVI.; 1791 incorporated as a borough under its present name; 1812 made the cap. of the state, and 1860 received a city charter. Pop (1910) 64,186.

HAR'RISON: town in Hudson co., N. J.; on the Passaic river opposite a part of Newark; on the Penn. and the Del., Lackawanna and Western railroads. It is connected with Newark by two railroad bridges and one wagon bridge, has a street railroad extending into Newark, is lighted with gas and electricity, and contains churches, machine-shops, branch of Newark thread works, stone yards, large steel-works, brewery, shade-roller and linoleum factories, union school, fire dept., and water and sewage service. Pop. (1910) 14,498.

HARRISON, *hăr'ĭ-son*, BENJAMIN: about 1740–1791, Apr.: b. Berkeley, Va.: signer of the Declaration of Independence, He was graduated at William and Mary Col-

lege, became a member of the house of burgesses and speaker 1764, 1777–82, opposed the stamp act resolutions 1765, was a delegate to congress 1774–77; introduced the resolution declaring the independence of the colonies, as chairman of the committee of the whole 1776, June 10, reported and signed the Declaration of Independence July; was gov. of Va. 1782–85, and opposed the ratification of the Federal constitution 1788.

HAR'RISON, Benjamin, twenty-third President of the United States: b. North Bend, O., 1833, Aug. 20; d. Indianapolis, Ind., 1901, March 13. He was a son of John Scott Harrison, and grandson of Pres. William Henry Harrison who was third son of Benjamin Harrison, a signer of the Declaration of Independence. He was brought up on his father's farm, spent two years at Farmer's College near Cincinnati, graduated at Miami Univ. 1852, was admitted to the bar, and settled in Indianapolis to practice 1854. In 1860 he was elected reporter of the Indiana supreme court, and while holding the office assisted in raising the 70th regt. of Indiana volunteers, of which he was appointed col. by Gov. Morton 1862. On taking the field the regt. was assigned to the right of Gen. William T. Ward's brigade and held the place to the close of the war. During the first 18 months of the service it was engaged in Ky. and Tenn., and its commander had no opportunity to distinguish himself. In 1864, Jan., he was assigned to the command of the brigade, and it was attached to the 1st div. of the 11th corps being subsequently incorporated with the 3d div. of the 20th corps under Gen. Hooker. Under the last transfer he took part in the campaign from Chattanooga to Atlanta, led his command in the battle of Resaca, 1864, May 14—where he captured the Confederate lines and 4 guns—and later in the capture of Cassville, the actions at New Hope Church and Golgotha Church, and the battles of Kenesaw Mountain and Peach Tree creek. His gallantry on these occasions induced Gen. Hooker to recommend to the sec. of war his promotion to brig.gen. In 1864, Sep.—Nov., he was on recruiting service in Ind., during the winter of 1864–5 in Tenn. with Gen. Thomas, in the spring 1865 resumed command of his brigade, and June 8 was mustered out of the service with the rank of brev.brig.gen. While absent in the field the office of supreme court reporter was declared vacant and a new reporter elected; but while at home recruiting he made a canvass of the state and was elected for a second term, on which he entered after being mustered out of the army. In 1868 he declined a third election and resumed practice, and then and 1872 made a large number of political speeches through the state. In 1876 he was tendered and declined the republican nomination for gov. of Indiana, but on the withdrawal of Godlove S. Orth, the nominee, during the canvass, he consented to the use of his name Though defeated by the democratic candidate, he developed unlooked for strength. He was appointed a member of the Mississippi river commis-

BENJAMIN HARRISON.

Twenty-third President of the United States.

sion 1879, was chairman of the Ind. delegation in the national republican convention 1880, declined a cabinet appointment tendered by President Garfield, and was elected U. S. senator for the term 1881, Mar. 4—1887, Mar. 3. In the senate he was regarded as a sound lawyer and able debater. He favored a judicious tariff reform, supported Senator Edmund's civil service reform resolution, opposed President Cleveland's pension vetoes, urged the improvement of the navy, and took a decided stand against the evil of foreigners acquiring large tracts of public and private lands to the exclusion of actual settlers. In 1884, he was delegate-at-large from Indiana to the Republican national convention, and in the convention of 1888 he received the presidential nomination on the 8th ballot. In the ensuing election he received a popular vote of 5,441,923 and an electoral vote of 233, against a popular vote for Cleveland of 5,536,524 and electoral 168. In 1892, June, he was renominated by his party by a vote of 535¼ to 183⅙ for James G. Blaine, 179 for William McKinley, and 4 for Thomas B. Reed. He received a popular vote of 5,186,951 and an electoral vote of 145, against a popular vote of 5,553,142 and an electoral vote of 276 for Mr. Cleveland. In 1893 he became lecturer on constitutional law in the Leland Stanford Jr. Univ.; was counsel for Venezuela in the boundary dispute with Great Britain, and U. S. member of the Hague international court of arbitration. He wrote *This Country of Ours* (1897). A complete collection of his public addresses from 1888 to 1892 was edited by Hedges (1892). A posthumous collection of articles, *Views of an Ex-President*, was published in 1901. Consult the campaign life by Lew Wallace (1888), and Wilson (editor), *The Presidents of the United States* (1894).

HARRISON, Burton Norville, American lawyer: b. New Orleans 1836; d. Washington ,D. C., 1904, March 29. He was graduated from Yale in 1859, shortly afterward became professor of mathematics and astronomy in the University of Mississippi, and at the outbreak of the Civil War was appointed private secretary to Jefferson Davis, president of the Confederate States. Captured with Davis, he remained in imprisonment until January 1866, when his release was effected by the intervention of F. P. Blair and President Johnson. Subsequent to the war he followed the law in the north with much success.

HAR'RISON, Carter Henry: lawyer: b. Fayette Co., Ky., 1825, Feb. 15. He was brought up on a farm, graduated at Yale College 1845, and at the law dept. of Transylvania Univ., Ky.; removed to Chicago and began practicing 1855, and subsequently abandoned law for real-estate operations. He was elected a co. commissioner 1871, member of congress 1874–76, and mayor of Chicago 1879, 1881, 83, 85, 93. He was assassinated 1893, Oct. 28.

HAR'RISON, Carter Henry: b. Chicago, 1860, Apr. 23; son of preceding. Educated at St. Ignatius Coll., Chicago; Altenburg, Germany, and Yale Law School, grad-

uating 1883. Engaged in law practice; newspaper editorship; was elected mayor of Chicago 1896, 1899, 1901, 1903.

HARRISON, Charles Custis: an American educator; b. in Philadelphia, Pa., 1844, May 3; was graduated at the University of Pennsylvania in 1862; engaged in manufacturing 1863–92; became a trustee of the Univ. of Penn. in 1876; acting provost, 1894, and provost, 1895.

HAR'RISON, Constance (Cary), novelist: b. near Alexandria, Va., 1845, Apr. 25. In 1867 the family removed to Richmond, and there she became the wife of Burton Harrison, formerly private secretary to Jefferson Davis. About this time brief sketches and stories from her pen began to attract attention, but it was not until 1879 that the first of her several successful works appeared. This was *Goldenrod: An Idyll of Mount Desert.* Among other works by her are *Woman's Handiwork in Modern Homes* (1881); *Old-Fashioned Fairy-Book* (1884): *Bar Harbor Days* (1887); *The Anglomaniacs* (1887); *Sweet Bells out of Tune* (1893); *An Errant Wooing* (1895); *A Bachelor Maid* (1894); *A Son of the Old Dominion* (1897); *A Merry Maid of Arcady* (1897); *Good Americans* (1898); *A Princess of the Hills* (1901); a play, *The Unwelcome Mrs. Hatch* (1901); etc.

HAR'RISON, Frederick, lawyer: b. London, England, 1831, Oct. 18. He was educated at King's College School, London; elected scholar of Wadham College, Oxford, 1848, and graduated 1853; was fellow and tutor there and studied law till 1858, when he was called to the bar; was sec. of the royal commission for the digest of the laws 1869–70; and was prof. of jurisprudence and international law to the Inns of Court, 1877–89; and alderman London County Council 1889–92. He was a founder of the Positivist School 1870, and the Newton Hall 1881; has contributed largely to the *Westminster, Fortnightly,* and *Contemporary Reviews,* and the *Nineteenth Century;* and published *The Meaning of History* (1862); *Order and Progress* (1875); an English translation of vol. ii. of Comte's *Positive Polity* (1875); *The Choice of Books, and Other Literary Pieces* (1886); *Oliver Cromwell* (1888); *Annals of an Old Manor House* (1893–9); *Victorian Literature* (1895); *William the Silent* (1897); *The Millenary of King Alfred* (1897); *Tennyson, Ruskin, Mill, and Others* (1899); *Byzantine History in the Early Middle Ages* (1900); *American Addresses* (1901); *Life of Ruskin* (1902); *Theophano* (1904); *Chatham* (1905); etc.

HARRISON, Gabriel, American author and artist: b. Philadelphia, Pa., 1825, March 25; d. Brooklyn, N. Y., 1902, Dec. 15. He began life as a photographer and an actor and in 1845 supported Charles Keane at the Park Theater, New York, and later taught elocution, and wrote dramatic and art criticism. Among his works are: *Life of John Howard Payne* (1873); dramatization of *The Scarlet Letter* (1878); etc.

HARRISON, James Albert, American philologist: b. Pass Christian, Miss., 1848, Aug. 21. He was graduated

at the University of Pennsylvania in 1868; and has since been professor of Latin and modern languages at Randolph-Macon College, Va., 1871–6; of English and modern languages at Washington and Lee University 1876–95; and of English and romance languages at the University of Virginia. He is a prominent member of the American Philological Association and the founder and editor of the *Library of Anglo-Saxon Poetry*. Among his works are: *Group of Poets and their Haunts* (1881); *Story of Greece* (1885); *Dictionary of Anglo-Saxon Poetry* with Baskerville (1886); etc. He has also edited many works.

HAR'RISON, John: d. 1660, Oct.; b. England: soldier and regicide. As col. in the parliamentary army he had charge of the transfer of Charles I, from Hurst Castle to Windsor 1648, Dec. 19–23, and from Windsor to London for trial 1649, Jan. 19; was afterward appointed a maj.-gen. and member of a committee to frame a policy for the new govt.; attained great influence under Cromwell; became leader of the Anabaptists 1653; and was one of the parliamentary leaders who were put to death on the restoration of Charles II.

HAR'RISON, John, mechanician: 1693–1776; b. Faulby, near Pontefract, Yorkshire, England. His mechanical genius early led him to study the construction of clocks and watches, with a view to diminishing as much as possible their errors and irregularities; and by 1726 he had effected considerable improvements. In 1714, the government had offered prizes of £10,000, £15,000, and £20,000 for the discovery of a method for determining the longitude within 60, 40, or 30 m. respectively. After repeated attempts, Harrison constructed a chronometer, which, in a voyage to Jamaica 1761–2, was found to determine the longitude within 18 m. he therefor claimed the reward of £20,000, which, after a delay caused by another voyage to Jamaica and further trials, was awarded to him 1765—£10,000 to be paid on Harrison's explaining the principle of construction of his chronometer, and £10,000 whenever it was ascertained that the instrument could be made by others. The success of Harrison's chronometer is owing to his application of the *compensation curb* to the balance-wheel, and on the same principle he invented the *gridiron pendulum* for clocks. These, with his other inventions, the *going fusee* and the *remontoir escapement*, were considered the most remarkable improvements in the manufacture of watches of the last century (see Horology). Harrison always regretted his lack of early education. He died in London.

HARRISON, Joseph, American engineer: b. Philadelphia, 1810, Sept. 20; d. there, 1874, March 27. In 1834 he began the construction of locomotives, and in 1840 designed for the Reading railway an engine which was copied and introduced into Russia with such success that he was invited to Russia, and there with two other American engineers concluded a contract with the Russian government to build the rolling-stock and locomotives

of the St. Petersburg and Moscow railway. He executed also other important contracts with that government, and in 1852 returned to the United States, where he subsequently patented a safety-boiler and received both the gold and silver Rumford medals from the American Academy of Arts and Sciences. In 1869 he published a folio containing his autobiography, incidents of his Russian experience, and his poem, *The Ironworker and King Solomon*.

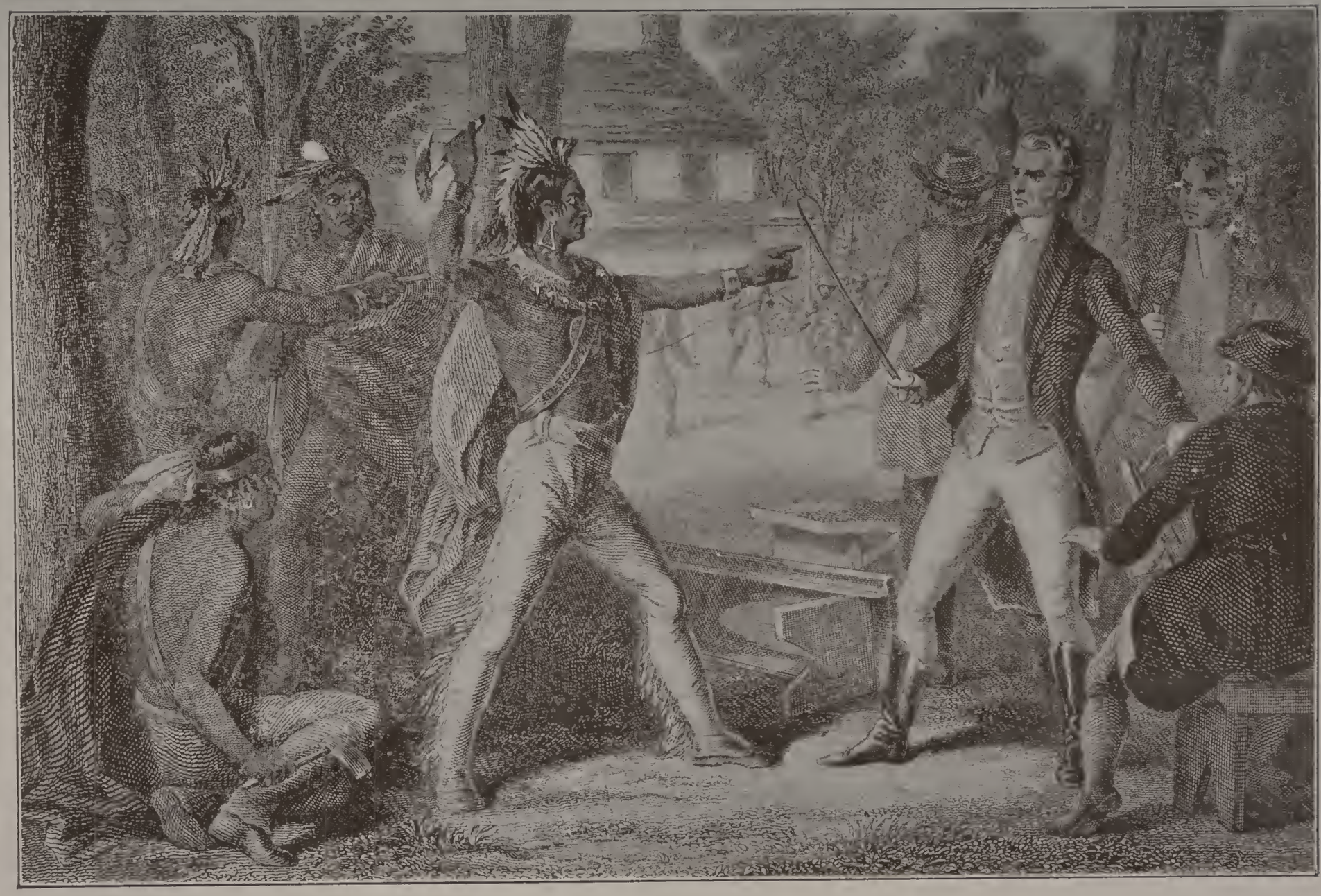
HARRISON, Lovell Berge, American artist: b. Philadelphia, 1854, Oct. 28. He studied with Alexander Cabanel in Paris, became known for his landscapes, especially snow-scenes, and obtained medals at the Paris Salon (1887); the Columbian Exposition (1893); and the Louisiana Purchase Exposition at St. Louis (1904). His works include: *Friends or Foes; A Waif from the Sea; Calling Home the Cows;* and *November,* purchased by the French government for the Marseilles Museum.

HARRISON, Mary Saint Leger (Lucas Malet), English novelist: b. Eversley, Hampshire. She is a daughter of Charles Kingsley (q.v.) and was married to Rev. William Harrison, rector of Clovelly, who died in 1897. She inherits the talent of the Kingsleys and her novels published under the pseudonym of 'Lucas Malet' have been as widely popular in America as in England. They are marked by vigorous characterization and skilful construction, and include: *Mrs. Lorimer* (1882); *Colonel Enderby's Wife* (1885); *Little Peter* (1887); *A Counsel of Perfection* (1888); *The Wages of Sin,* a notably strong tale (1891); *The Carissima* (1896); *The Gateless Barner* (1900); *Sir Richard Calmady* (1901).

HAR'RISON, Thomas Alexander, painter: b. Philadelphia, Pa., 1853, Jan. 17. He studied under Gerôme, at the Ecole des Beaux-Arts, Paris; won a first-class medal at the Paris exposition 1889; was knighted in the Legion of Honor; and won a medal in the Munich exposition 1890. He excels in marine and figure painting, though he occasionally chooses landscape. He is a member of the Society of American Artists, New York. Among his noted paintings are: *Gloaming, Castles in Spain, Coast of Brittany, Little Slave, The Seashore,* etc.

HARRISON, Susan Frances Riley, Canadian author: b. Toronto, 1860, Feb. 24. She was at one period literary editor of the Toronto *Week* and has been a frequent contributor to American and English periodicals. She has written *Crowded Out and Other Sketches* (1889); *Pine, Rose, and Fleur-de-Lis* (1891); *Down the River and Other Poems* (1891); and edited an anthology, *French and English Native Writers* (1889).

HAR'RISON, William Henry, ninth President of the United States: 1773, Feb. 9—1841, Apr. 4; b. Berkeley, Charles co., Va., son of Gov. Benjamin Harrison (1740–91), who signed the Declaration of Independence. He studied at Hampden and Sidney College, later pursued a



GEN. W. H. HARRISON AND TECUMSEH.

course in medicine, but did not graduate, and received from Washington a commission in the army. His first military service was to command a company of twenty men as an escort for a train of pack-horses to Fort Hamilton, a military post on the west bank of the Big Miami River from which the seat of Butler County was named. In 1793 he joined the new legion under General Anthony Wayne who made him an aide-de-camp, and in December of that year he took part in the expedition which repossessed General St. Clair's field of battle, and erected thereon Fort Recovery. He participated in all the engagements with the Indians and their British allies during this campaign, and displayed conspicuous gallantry at the Battle of Fallen Timbers. Shortly after the close of this campaign Harrison was advanced to the rank of captain and placed in command of Fort Washington. The position was largely a confidential one. In the spring of 1798 Harrison resigned his commission in the army and settled on a tract of land at North Bend about 16 miles from Cincinnati, but was immediately appointed by President John Adams as secretary of the Northwest Territory under General Arthur St. Clair as governor. A year later he resigned this position to take his seat in Congress as the first delegate from the Territory. Up to this time the public lands had been sold in such vast tracts that none but men of wealth could buy them. Harrison secured the division of the land into small tracts and made it possible for the poor man to obtain a homestead. During that session of Congress a part of the Northwest Territory was formed into the Territory of Indiana. It included the present States of Indiana, Illinois, Michigan, Wisconsin, and a part of Minnesota, and contained a civilized population of nearly five thousand souls. Harrison was appointed its first governor by President Adams, and was successively reappointed by President Jefferson and President Madison. He was also made superintendent of Indiana affairs. Governor Harrison organized the new government at Vincennes. Many difficult questions demanded his attention, but the most difficult and delicate was the restless and finally hostile attitude of the savages under the leadership of Tecumseh, and the preaching of Tecumseh's brother 'the Prophet'. The beginning of open warfare by the Indians was averted many times by his calmness and courage. He made in all thirteen treaties with the Indians, and secured the cession from several tribes of more than three million acres of land on the Wabash and White Rivers, Tecumseh condemned these treaties on the ground that the land belonged to all of the Indians, and that a single tribe could not give a legal title without the consent of every other tribe. Harrison invited Tecumseh to Vincennes for a conference, and directed that he should bring with him not more than thirty warriors; but he came with four hundred completely armed. There were many evidences that treachery was intended, and but for the conciliatory methods of the governor, the council

would have terminated in bloodshed. Nothing was accomplished by this interview, nor by a second in the following summer. Meanwhile, frequent depredations by the Indians made it evident that conciliatory measures could no longer be employed, and in 1811, Sept. 26, Harrison set out with 900 men to punish them. On November 6, when the army was within a short distance of Tippecanoe, it was met by messengers demanding a parley. A council was agreed upon for the next day, but at 4 o'clock on the following morning, the treacherous savages fiercely attacked the camp of Harrison in an endeavor to take it by surprise. The fighting continued till daylight when the Indians were routed with great loss. In the war of 1812 Harrison was appointed to the chief command of the Northwest, and given a major-general's commission. He urged upon the government the importance of creating a navy on the Lakes. That advice was heeded, and the splendid achievement of Commodore Perry in 1813, Sept. 10, was made possible. Six days after Perry's victory General Harrison embarked his artillery and supplies for a descent on Canada. The British general, Proctor, burned the fort and navy-yard at Malden and retreated, closely pursued by Harrison who overtook him and his Indian allies led by Tecumseh near the river Thames. Within five minutes almost the whole British force was captured, and shortly afterward the Indians were completely routed, and their leader Tecumseh was slain.

During the years between the war of 1812 and the presidential campaign of 1840 Harrison was in turn a member of Congress, state senator in the general assembly of Ohio, presidential elector, United States senator from Ohio, and minister to the United States of Colombia. In 1829 he retired to his farm at North Bend. In December 1839, he was nominated by the national whig convention for the presidency of the United States, with John Tyler of Virginia for vice-president. The campaign which followed was one of the most exciting in the history of the country Political mass meetings and processions were introduced for the first time, and party watchwords and emblems were employed with telling effect. That canvass has commonly been called the 'log-cabin and hard cider campaign.' The eastern end of General Harrison's house at North Bend consisted of a log cabin covered with clapboards, and his table was reputed to be well supplied with good cider, instead of wines. Log cabins and hard cider thus became party emblems typifying republican simplicity. 'Tippecanoe and Tyler too' was shouted and sung and emblazoned from one end of the country to the other. Nothing could stem the tide of wonderful popular enthusiasm for the hero of Tippecanoe and the Thames. Van Buren, the Democratic candidate, received only 60 electoral votes out of 294. The death of the President occurred only 31 days after his inauguration. Consult Bostwick in Wilson's *Presidents of the United States* (1894).

HAR'RISONBURG, Va., town, county-seat of Rockingham county: on the Chesapeake & W., the Southern, and the Baltimore & O. R.R.'s; about 100 miles northwest of Richmond. It is in the Shenandoah valley, and is surrounded by a rich agricultural country. Its chief manufactures are flour, staves, saw and planing mill products, foundry and machine shop products, and pottery. It is the trade centre for the greater part of the county. The town owns and operates the waterworks. Pop. (1900) 3,521. The place was occupied by Gen. Banks late in April 1862, and abandoned when Jackson forced Banks down the valley in May. When Jackson, in turn, was forced up the valley by the combined armies of McDowell and Frémont, he abandoned the main valley, moving from Harrisonburg to Cross Keys and Port Republic, his rearguard, two regiments of Virginia cavalry, under Gen. Turner Ashby, halting about two miles southeast of Harrisonburg. In 1862, June 6, Col. Wyndham, with the First New Jersey cavalry and a battalion of the Fourth New York, moving from Harrisonburg, attacked Ashby and was defeated and followed to within one mile of the town, with the loss of several men killed and wounded, and about 60 taken prisoners, including Wyndham himself. Gen. Bayard then pushed forward with cavalry and infantry and Ashby fell back and called for infantry support. Jackson sent him Stuart's brigade—First Maryland, Forty-fourth, Fifty-second, and Fifty-eighth Virginia. A few miles beyond Harrisonburg Bayard attacked with the Pennsylvania 'Bucktails' under command of Lieut.-Col. T. L. Kane, and in the engagement Ashby was killed, and Kane was wounded and captured. While this was happening on the right, the Sixtieth Ohio infantry and First Pennsylvania cavalry, on the left, drove in the Confederate skirmish-line, without loss on either side. As soon as the wounded could be removed the Confederates fell back in the direction of Port Republic, and the Union forces retired to Harrisonburg. The Union loss in the engagement was 65 killed, wounded, and missing. The Confederate loss including Ashby, was 18 killed, 50 wounded, and 3 missing.

HAR'RISONVILLE, Mo., city, county-seat of Cass county; on the Missouri, K. & T., and the Missouri P. R.R's.; about 30 miles southeast of Kansas City. It is situated in an agricultural and stock-raising region and the trade and manufactures are connected chiefly with the products of the surrounding farms. The shipping consists mostly of grain, live stock, lumber, and dairy products. Pop. (1900) 1,844.

HARRISSE, *hăr-ēs'*, Henri, American critic, bibliographer, and historian: b. Paris 1830, of Russian Hebrew parentage. He became a citizen of the United States, and for several years practiced law in New York. He has published *Bibliotheca Americana Vetustissima* (1866); *Christopher Columbus* (1884-5); *John and Sebastian Cabot* (1883); *The Discovery of North America;* etc.

HAR'RODSBURG, Ky., city, county-seat of Mercer county; on a branch of the Southern railroad; about 45 miles southwest of Lexington and 58 miles southeast of Louisville. It is the oldest permanent settlement in the State, and was founded by James Harrod in 1774. Two years later Kentucky was incorporated as one of the counties of Virginia and Harrodsburg was made the county-seat. Stock-raising and farming are the principal occupations in the surrounding country. It has flour and planing mills, a distillery, brick-yard, and ice factory. The climate, scenery, and the Greenville Springs nearby make it a pleasure and health resort. It is the seat of Beaumont College, an institution for women, opened in 1894. Pop. 3,000.

HARROGATE, or Harrowgate, *hăr'ō-gāt*, or High Harrowgate: town in Yorkshire, 20 m. w. of York, England; celebrated for sulphurous and chalybeate springs. The sulphurous springs are also saline, and of laxative and diuretic quality, while the chalybeate waters are tonic. Harrogate is a very agreeable residence, the surrounding country being full of beauty and interest; it is largely frequented by visitors in summer, and has of late rapidly increased in size. The waters are of considerable activity, and should be taken only under medical advice. They are used both externally and internally, and are in great repute in many diseases of the skin, and in some dyspeptic disorders, scrofula, gout, etc. Harrogate springs were discovered 1571. Concert rooms, summer and winter gardens, fine bath buildings and recreation grounds add to the town's attractiveness. Pop. 28,400.

HARROW, v. *hăr'rō* [OF. *harau*, a cry of distress; *harauder*, to utter a cry of distress or pain: Bret. *harao*, a cry when one is hooted]: to distress acutely; to lacerate, as the feelings; to harass. Har'rowing, imp.: Adj. acutely distressing; lacerating. Har'rowed, pp. *-rōd*, distressed. Har'rowingly, ad. *-lĭ*. Har'row, int., in *OE.*, exclamation of sudden distress or pain; a cry for assistance.

HARROW, n. *hăr'rō* [Dan. *harv;* Icel. *herfi*, a harrow; Fin. *hara*, a brush-harrow made of pine-tree branches; *harawa*, a hay-rake]: agricultural implement consisting of cross-bars and spikes, drawn over plowed land to level it and break the clods or lumps of earth: V. to break or tear with a harrow. Har'rowing, imp.: N. the act or process of drawing a harrow over plowed land. Har'rowed, pp. *-rōd*. Har'rower, n. *-ẽr*, one who.

HARROW: an agricultural implement for loosening and pulverizing the surface soil; used to prepare recently-plowed land for seeding, to cover the seed of grain crops, and sometimes to destroy weeds among cultivated plants. It was one of the earliest instruments used in cultivation, and is represented in many ancient sculptures. In its original form, the harrow was very rude, and its improvement was long delayed. As late as the second quarter of the present century, most of the harrows in use upon the

farms in this country were very heavy and inefficient implements. The frames were triangular, and the teeth were straight and long. Lighter frames and a square form were gradually adopted. The teeth were prevented from following each other by attaching the draft chain near one corner, thus giving it a diagonal position when in use. The labor of the team was lightened, and the value of the implement was increased. The frame was sometimes made in two sections, in order that it might be more easily handled, but the general character of the implement remained the same.

No marked change in construction was adopted until about 1857, when Share's Coulter harrow, working on an entirely new principle, was introduced. In this implement thin blades, quite wide and sloping backward, were used instead of teeth. This form combined the advantages of light draft, freedom from clogging, and a thorough cutting and fining of the surface soil. It proved of special value in preparing inverted sod land for planting or seeding. It was soon followed by the wheel, or disk harrow, by which the surface soil was cut by the sharp rims of steel wheels which were used instead of teeth. The frame was in the form of a triangle, and the disks were made slightly concave, that they might more thoroughly pulverize the soil. It was very efficient, but the draft was heavy and the bearings were subject to rapid wear. Another objection was found in the fact that by repeated harrowings the land was left in ridges. Improvements have been made by which the angle of the disks can be adjusted, and the principal difficulties with the older styles have been obviated. Another form is the spring-tooth harrow, in which curved springs are used instead of teeth or disks. The rotary harrow has a square frame, with straight teeth. The draft is from the centre, and a weight is so arranged that the teeth on one side will enter the ground more deeply than those on the other side, and thus give the harrow a rotary motion. A later and remarkably efficient invention is the Acme harrow, with which, by means of sets of curved steel blades, the ground is rapidly and finely pulverized, the depth of working being easily adjusted by means of levers. The Thomas smoothing harrow is invaluable for fining the surface, covering grain, and destroying weeds on recently planted land. Its teeth, about twice as many as in the common form, are round, and slope backward and to one side. The draft is so arranged that the frame moves diagonally, and the teeth do not follow each other The draft is light and the harrow does not clog

HAR'ROW-ON-THE-HILL: town of Middlesex, England, finely situated on the summit of a small eminence 200 ft. high, about 12 m. n. w. of London. Pop. 10,200. The town derives celebrity solely from the grammar-school founded here, 1571, by John Lyon, a wealthy yeoman of the parish, and attended by above 500 pupils. The school was originally intended to afford a gratuitous education to poor boys belonging to the parish, and is still

nominally free to all boys of the parish, but, as in many other cases, it has been diverted from its primary purpose, and is now attended chiefly by the sons of the nobility and gentry, and has a very high reputation. The instruction is modelled generally after that of Eton: originally purely classical, it now comprises also mathematics, modern languages, English literature, science, music, and drawing. The age of admission is 12 to 14 ;and there are six entrance scholarships of from $150 to $400 per annum, offered every Easter. The most valuable learning scholarships are Baring's three of $500 a year for five years to Hertford College, Oxford.

HARRY, v. *hăr′rĭ* [Scot. *herry*, to rob: AS *hergian*, to plunder: Icel. *heria*, to make an inroad on: comp. Icel. *herr;* Dan. *hær;* Ger. *heer*, a host, an army]: to plunder; to strip; to pillage; to handle roughly; to tease. HAR′RYING, imp. HAR′RIED, pp. *-rĭd;* also formerly written *harow:* see HARROW 1.

HARRY, *hăr′ĭ*, BLIND, or HENRY THE MINSTREL: Scottish minstrel of the 15th c. Scarcely anything is known of his life beyond what is told by Dr. John Major (or Mair) in his *History of Scotland*, 1521. 'When I was a child,' he says, 'Henry, a man blind from his birth, who lived by telling tales before princes and peers, wrote a whole book of William Wallace, weaving the common stories (which I, for one, only partly believe) into vernacular poetry, in which he was skilled.' In 1490–92, Blind Harry is found at the court of King James IV., receiving occasional gratuities of five, nine, and eighteen shillings. The poem attributed to him, *The Life of that Noble Champion of Scotland, Sir William Wallace, Knight*, was completed before the end of 1488, when it was copied by John Ramsay. This copy, the oldest MS. of the work now known to exist, does not ascribe it to Blind Harry, nor is his name given to it in the earlier printed editions. The poem, which contains 11.861 lines of ten syllables each, is written in rhyming couplets. The language is frequently obscure, sometimes unintelligible, but the work as a whole has some vigor; in some passages it even kindles into poetry; and it is altogether a surprising performance, if we receive it as the composition of one born blind. It has no claim to be regarded as history; it is full of gross mistakes or misrepresentations of well-known acts; and it can be viewed only as an embodiment of the sanguinary legends which two centuries had gathered.

HARSH, n. *hârsh* [Ger. *harsch*, rough: Dan. *harsk*, rancid: Scot. *harsk*, harsh, rough]: rigorous; rudely or unjustly severe; jarring; discordant; morose. HARSH′LY, ad. *lĭ*, in a harsh manner; with violence; morosely; unpleasantly to the ear. HARSH′NESS, n. roughness to the touch, in manners, or in words.—SYN. of 'harsh': rough; sour; austere; crabbed; peevish; unpleasing; vigorous, acrimonious; stern; tart;—of 'harshness': acrimony; tartness; asperity.

HART, n. *hârt* [AS. *heort;* Icel. *hiortr;* Ger. *hirsch*, a stag]: a stag or male of the red deer, from the age of six years, when the crown or *surroyal* of the antler begins to appear (see STAG). HART'BEEST, n. *-bēst* [Dut.]: a kind of stag or antelope found in s. Africa (see KAAMA). HARTWORT, n. *wĕrt*, an *umbelliferous* plant, the *Tordylĭŭm maxĭmum*. HARTSHORN, n. *hârts'hŏrn*, the horn of the hart; in pharmacy, the antlers of the *Cervus elaphus;* in composition very different from that of persistent horns, as of the ox, and identical, or nearly so, with that of bone. The products of its distillation were formerly much used in medicine, under the titles of oil of hartshorn, volatile salt of hartshorn, spirits of hartshorn, etc.; but they are now replaced by simpler preparations of the active ingredients of these substances: see AMMONIA.

HART, ALBERT BUSHNELL, an American educator: b. in Clarksville, Pa., 1854, July 1; was graduated at Harvard University in 1880; and became professor of history there. His publications include *Introduction to the Study of Federal Government; Epoch Maps; Formation of the Union; Practical Essays on American Government; Revised Suggestions on the History and Government of the United States: Studies in American Education; Coercive Powers of the United States Government; Guide to the Study of American History* (with Edward Chaning); *Life of Salmon Portland Chase; Handbook of the History, Diplomacy and Government of the United States* (1902); *Foundations of American Foreign Policy* (1901); *Actual Government* (1903); *Essentials of American History* (1905); etc. He was also editor of *Epochs of American History* (1891–96); *American History told by Contemporaries* (1898–1901); *American Citizen Series; Source Book of American History;* and joint editor of *American History Leaflets; Harvard Graduates Magazine;* and the *Historical Review*, etc.

HART, *hârt*, JAMES MCDOUGAL, painter: b. Kilmarnock, Scotland, 1828 May 28; d. 1901. He came to the United States with his parents when a child, was apprenticed to a coach-painter in Albany, N. Y.; studied landscape painting with Schirmer in Dusseldorf 1851–2, had a studio in Albany 1852–57, removed to New York 1857, and became a member of the National Acad. of Design 1859. His works are largely pastoral in character, include *Cattle Going Home and Moonrise in the Adirondacks* (1871); *In the Orchard* (1874); *Landscape, Road and Cattle* (1875); *A Misty Morning*, Centennial exhibit (1876); *Indian Summer*, Paris exhibit (1878); *Princess Lily* (1882); *Boughs for Christmas* (1884); *At the Watering Trough* (1885); *Three Little Maids*, and *On the North Shore* (1886).

HART, JAMES MORGAN, American scholar: b. Princeton, N. J., 1839. He was graduated from Princeton in 1860, studied in Göttingen, and took the degree of A. M. from Princeton in 1863. He was professor of modern languages at Cornell (1868–72); professor of modern languages and English literature in the University of Cincinnati (1876–

90); returning to Cornell as professor of rhetoric and English philology in 1890. He has written: *German Universities* (1874); *Syllabus of Anglo-Saxon Literature* (1887); *Hand-book of English Composition* (1895); has revised and edited his father's *Manual of Composition and Rhetoric* (1897); and has translated *German Classics* and *Goethe Prose Selections*, etc.

HART, Joel T., sculptor: 1810-1877, Mar. 1; b. Clark co., Ky. He learned the mason's trade, educated himself, and while working as a stone-cutter at Lexington began modelling busts in clay. He soon attained a phenomenal success in portrait-busts, and on receiving a commission for a marble statue of Henry Clay from the Ladies' Clay Assoc. of Richmond, Va., 1849 went to Florence, Italy, to study and work. Beside the marble statue of Clay for Richmond, he made one of the statesman in bronze for New Orleans, and another in marble for Louisville. He executed many busts and statues of eminent men during his 28 years' residence in Florence, and, among ideal pieces, *Angelina, Il Penseroso*, and *Woman Triumphant*. His remains were removed from Florence to Lexington, Ky., 1884, where the state erected a monument over them.

HART, John: 1708–1780; b. Hopewell tp., N. J.; signer of the Declaration of Independence. He was brought up on a farm, served several terms in the provincial legislature, was a member of the continental congress, 1774–77, and chairman of the N. J. council of safety 1777–8, had his farm and stock destroyed and was obliged to flee with his family on the British invasion of the state, and was not free from persecution till after the British defeats at Trenton and Princeton. His character was singularly pure and simple

HART, John Seeley, American educator: b. Stockbridge, Mass., 1810, Jan. 28; d. Philadelphia, Pa., 1877, March 26. He was for many years principal of the New Jersey State Normal School, at Trenton, and subsequently professor of English literature at Princeton College. His text-books on English and American literature had a wide circulation, and in the long course of his career as educator he did much to stimulate a taste for good literature among students.

HART, Nancy, revolutionary heroine: about 1755–1840; b. Elbert co., Ga. She was zealous in supporting the patriotic cause, incurred the fear of the tories by many acts of daring, and particularly distinguished herself by overcoming a party of 5 straggling British soldiers from the Augusta camp, who visited her cabin for violence and plunder. She shot one dead, killed a second while attempting to escape, and held the others as prisoners till help arrived. Hart co., Ga., was named in her honor.

HART, Sir Robert, English diplomatist, director of the Chinese imperial maritime customs: b. Portadown, County Armagh, Ireland, 1835. He was educated at the Taunton Wesleyan School, and was graduated at Queen's College, Belfast. He entered the British consular service

in China in 1854, was appointed inspector-general of customs in 1863 and accepted his present position in 1885. During the Boxer outbreak in 1900, he underwent the siege in the British legation, at Peking, and since then has published his view on the position of things in China in a very remarkable work, *These From the Land of Sinim* (1901). He attributes the disturbances in China to the arrogance of foreigners and the unyielding pride of the Chinese. He discusses China's army, law, transportation, communication, currency, education, administration, and religion in a highly optimistic vein, and shows that the Chinese government does a great deal better than it gets credit for. He is a firm believer in the Chinese plans for reform. He is certainly deeply trusted by the Chinese authorities and is one of the best oriental administrators that England has ever been blest with in China.

HART, Samuel, American Episcopal clergyman: b. Saybrook, Conn., 1845, June 4. He was graduated from Trinity College in 1866, and was ordained priest of the Episcopal Church in 1870. He was at Trinity College as assistant professor of mathematics (1870–3), professor of mathematics (1873–83), and professor of Latin (1883–99). In 1899 he became vice-dean and professor of doctrinal theology at Berkeley Divinity School. In 1886 he was appointed custodian of the Standard Prayer Book of the Episcopal Church of the United States, in 1892 secretary of the House of Bishops, and in 1896 historiographer of the church. He is a member of several learned societies, including the American Historical Society, the American Oriental Society, and the Society of Biblical Literature and Exegesis. He is editor of *Satires of Juvenal; Satires of Persius*, Bishop Seabury's *Communion Office*, Maclear's *Instruction for Confirmation and Holy Communion* (1895); *History of Am. Prayer Book* in Frere's *Procter* (1901); *Short Daily Prayers for Families* (1902); etc.

HART, Solomon Alexander, r.a.: painter 1806, Apr. —1881, June 11; b. Plymouth, Devonshire, England, of Jewish origin. He entered the Royal Acad., London, 1823. Among his works are—*The Elevation of the Law* (1830); *Isaac of York* (1830); *Eleanor Sucking the Poison from Edward's Arm; Milton Visiting Galileo in Prison* (1847); *The Three Inventors of Printing* (1852); *Lady Jane Grey* (1860). In 1840, Hart became r.a.; 1854, professor of painting; 1865, librarian of the Royal Academy.

HART, William, painter: b. Paisley, Scotland, 1823, Mar. 31; d. Mt. Vernon, N. Y., 1894, June 17. He was a brother of James McDougal Hart. He accompanied his parents to Albany, N. Y., when a child, was apprenticed with his brother to a coach-maker, and like him executed his first art work on carriage panels and decorations. In 1848 he first exhibited paintings on canvas at the National Acad. of Design; 1850–53 travelled and studied in Europe, 1854 opened a studio in New York, 1855 was elected an associate of the National Acad., and 1858 an academician. He was the first pres of the Brooklyn Acad. of Design, a

founder of the American Soc. of Water-color Artists, and its pres. 1870–73. His works include *Autumn in the Woods of Maine* (1867); *Scene on the Peabody River*, water-color (1868); *Twilight on the Brook* (1869); *Goshen, N. H.*, water-color, and *A Brook Study* (1870); *The Golden Hour* (1872); *Morning in the Clouds* (1874); *Keene Valley* (1875); *Cattle Scenes* (1876); *Scene on Nepanock Creek* (1884); *A Modern Cinderella* (1885); etc.

HARTE, *hârt*, FRANCIS BRET: American author of original power; b. Albany, N. Y., 1839, Aug. 25; d. Aldershot, England, 1902, May 6. His father, a teacher, died while Harte was very young. In 1854, Harte went to California, where he was successively employed in gold-mining, in keeping a school, and as a compositor. About 1857, he began to contribute sketches of Californian life to one of the San Francisco newspapers, the *Golden Era*, and was soon promoted to the editorial staff, and not long afterward became editor of the weekly *Californian*. In 1864–70, Harte was sec. of the U. S. branch mint in San Francisco. Several of his poems published during this period were widely copied and admired, *The Society upon the Stanislaus*; *The Pleiocene Skull*. But the unmistakable first-fruits of his genius were the contributions to the *Overland Monthly*, a magazine started under his editorship 1868. *The Luck of Roaring Camp*, a sketch of rough mining life, was followed by *The Outcasts of Poker Flat;* and the striking originality of both sketches established his reputation, which was increased by a short satirical poem known as the *Heathen Chinee*. For a time he held the professorship of recent literature in the Univ. of California; but in 1871 he went to the eastern states, settling first in New York, then in Boston He was appointed U. S. consul at Crefeld, Prussia, 1878; and at Glasgow 1880. He was a frequent contributor to the *Atlantic Monthly*. In 1885 his tenure of office as consul came to an end, and he settled in London, devoting his whole time to literary work He was a prolific writer, and continued for the most part to deal with California themes. Among his shorter stories the following may be mentioned: *Miggles; The Outcast of Poker Flat; M'Liss* (1872); *The Twins of Table Mountain* (1879); *An Heiress of Red Dog* (1879); *Flip* (1882); *On the Frontier* (1884); *By Shore and Sedge* (1885); *Devil's Ford* (1887); *A Phyllis of the Sierras*, and *A Drift from Redwood Camp* (1888); *The Heritage of Dedlow Marsh* (1889); *A Sappho of Green Springs* (1891); *The Bell-Ringer of Angel's* (1894); *A Protégé of Jack Hamlin's* (1894); *Barker's Luck* (1896); *Tales of Trail and Town* (1898); *Stories in Light and Shadow* (1898); *Mr. Jack Hamlin's Mediation* (1899); and *From Sand Hill to Pine* (1900), a collection of short stories. His longer stories and novels include: *Gabriel Conroy* (1876); *Thankful Blossom: A Romance of the Jerseys* (1877); *In the Carquinez Woods* (1883); *Maruja* (1885); *Snowbound at Eagle's* (1886); *The Crusade of the Excelsior* (1887); *Cressy* (1889); *A Waif of the Plains* (1890); *A Ward of the Golden Gate* (1890); *A First Family*

FRANCIS BRET HARTE.

of Tasaiara (1892); *Colonel Starbottle's Client, and Some Other People* (1892); *Clarence* (1895);. dealing with incidents in the American Civil War; *In a Hollow of the Hills* (1895); and *Three Partners* (1897); He also wrote much verse comprised in volumes entitled *Poems* (1871); *East and West Poems* (1871); *Echoes of the Foot-Hills* (1874); and *Some Later Verses* (1898).

In estimating Harte's work it must be remembered that it was his rare good fortune to break new ground, and to become the first literary interpreter of a life which with its primitive breadth and freedom, its striking contrasts of circumstance and character, offered singular opportunities to the novelist. That he ever did anything quite so good as his first group of stories and poems cannot be said, for his later volumes are marked, as a whole, by the repetition of well-worn motives and by declining spontaneity and power. Still, the average quality of his output remained high; and when the circumstances of its production are borne in mind, it may perhaps seem remarkable that it should have preserved so many traces of the writer's youthful freshness and vigor. Among qualities of his work those which perhaps most constantly impress the critical reader are his dramatic instinct, his keen insight into character, his broad sympathy, and his subtle and pervasive humor. Dealing for the most part with large, strongly marked, elemental types, as these develop and express themselves under conditions which give free play to instinct and passion, he does not indulge in lengthy analyses or detailed descriptions. His men and women are sketched with a few strokes, and left to work out their own personalities in speech and deed; and yet, such is the skill with which this is accomplished that they stand out before us as creatures of real flesh and blood. He did not purposely soften the shadows in his pictures; the sin and wretchedness of frontier life are frankly portrayed; none the less, there can be little doubt that consciously or unconsciously he contrived to throw an idealizing glamor over the mine and the camp, and that many of his most lifelike and successful characters are wrought in the imagination, though out of the stuff of fact. But it is here that we touch upon what is perhaps one of the finest qualities of his work,—a quality not to be separated from his tendency toward idealization. Though he dwelt habitually upon life's unexplained and inexplicable tragic complexities, he nevertheless suffused his stories with an atmosphere of charity, clear, sweet, and wholesome. The weakness of his writings is closely connected with some of its main elements of strength. A master of condensed and rapid narration, he produced many stories which are too sketchy in method to be completely satisfactory; while in his desire to achieve terseness he occasionally sacrificed clearness of plot. This is particularly the case with his more ambitious efforts, especially with his long novel *Gabriel Conroy*, an elaborate study of the culture conditions of early California civilization, which, though it abounds in memorable des-

criptions and vivid character sketches, lacks wholeness and proportion. As a writer of verse, he is unequal; some of his poetry shows the originality and power of his earlier prose, while much is of too temporary a character to find a lasting place in literature. Consult: Pemberton, *Life of Bret Harte.*

HARTEBEEST. See KAAMA.

HARTFORD, *hârt'ford:* city, capital of Hartford county and of the state of Connecticut, at the head of navigation on the Connecticut river, 50 m. n. of its mouth. By the main line of the New York, N. H. & H. railroad it is 110 miles from New York and 124 from Boston (a midway position which has enhanced its business development), 36 from New Haven, and 26 from Springfield, Mass.; the Highland Division (old N. Y. & N. E.) connects it with Fishkill on the Hudson (110 miles) and Providence, R. I. (90 miles); the Valley Division extends down the river to its mouth, the Connecticut Central to Springfield east of the river. The Central New England runs to Poughkeepsie, and beyond. Hartford is one of the most attractive cities in New England, is about 5 m. long and 3 m. wide, is intersected by Park river, which is spanned by 11 bridges, and is connected with E. Hartford on the opposite side of the Connecticut river, by a bridge 1,000 ft. long. It occupies an elevated site; is compactly built, its business portion mostly of brick, iron, granite, and free-stone; has many beautiful suburban residences, and is laid out in generally broad, straight streets, a part running parallel with the river, the others intersecting them at right angles and extending e. and w. The principal business streets are Main, State, Commerce, Pratt, Pearl, Central Row and Asylum. Park river almost encircles an area of 46 acres which has been converted into a beautiful pleasure resort bearing the name Bushnell Park, in honor of the Rev. Horace Bushnell, D.D. (q.v.), who suggested the reclamation of the tract for a public park; and containing the magnificent new capitol, and life-size statues of Gen. Israel Putnam, of Bp. Thomas Church Brownell, founder of Trinity College, and of Horace Wells, M.D., discoverer of anæsthesia. The park system contains about 1,200 acres, the oldest being Bushnell Park, mentioned above. The largest is Keney Park in the extreme north, extending into Windsor, 663.4 acres; next Goodwin Park in the extreme south, some 200 acres. Elizabeth Park in the extreme west, largely in West Hartford, 90 acres, is the nursery for the other parks; Pope Park southwest of the centre has 73 acres, ultimately to be 92 with city additions; and Riverside Park is a reclamation and beautifying of the formerly squalid river front north of the East Hartford bridge. There are also smaller squares and spaces. The city and its immediate vicinity have many beautiful drives and promenades, the most popular of the former being to Tumble-down Brook, 8 m. distant on the Albany road; Talcott Mountain, 9 m. w., where Wadsworth's Tower affords a delightful and varied view; Trout-brook Reservoir, on the

Farmington road; Prospect Hill; Wethersfield, 4 m. s., and E. Hartford, by the long bridge. The two last places contain many very old and quaint buildings.

Buildings.—The public buildings include the new capitol on Bushnell Park, of white marble, in the secular Gothic style, cost $3,350,000; the state house, built of brick 1794, containing the original charter granted the colonists by Charles II. and secreted from Gov.Gen. Andros in the oak tree 1687, framed in the wood of the historical tree, portraits of the colonial and state governors, and the state library; the city hall, a handsome Grecian building on Kingsley street; U. S. govt. building; Union railroad depot; state arsenal, opera house, the red sandstone Cheney building, the building of the Connecticut Mutual Life, the Ætna Life, the Phœnix Mutual Life, and the National Fire insurance companies, the Phœnix and First National Bank buildings and the Wadsworth Atheneum.

Educational Institutions.—The chief educational institutions are Trinity College (Prot. Episc.), founded under the name of Washington College 1823, formerly occupying the site of the new capitol, but now in the s. part of the city; the Hartford Theological Seminary (Congl.), founded at East Windsor 1834; the Hartford High and Grammar School founded 1855; the Hartford Female Seminary; a popular school for young ladies; nunneries and free Rom. Cath. schools; and many public schools. The high school building cost with land and equipment nearly $600,000 and is one of the best equipped schools of its class in the country.

The library facilities of the city are very large for its size, and far more varied in contents than if they had been collected by a single institution. In the Wadsworth Atheneum are housed the Hartford Free Public Library with 79,000 volumes, the Watkinson Library (reference only) with 59,000, and the Connecticut Historical Society with about 25,000, besides as many pamphlets, and toward 50,000 MSS. The libraries of the Theological Seminary (85,000, and about 40.000 pamphlets) and Trinity College (43,000) contain many valuable specialties; and the State Library in the capitol (40,000, and some 50,000 MSS.), with its great collection of statues, law reports, public documents, Hansard, etc., is of extreme value.

Religious and Charitable Institutions.—There are about 75 ecclesiastical buildings including Advent churches, 9 Bapt., 13 Congl., 9 Prot. Epis., 7 Meth. Episc., 10 Rom Cath., German Lutheran, Hebrew, Presb., Cath. Apostolic, Unitarian, and Universalist. Hartford is the seat of a Rom. Cath. bp. and contains the cathedral of the diocese. The Church of the Good Shepherd (Prot. Episc.) erected by Mrs. Samuel Colt, Christ Church (Prot. Episc.), Park and Pearl Street Churches (Congl.), South Baptist, First Methodist, and St. Patrick's Cathedral (Rom. Cath.), are among the most beautiful and costly church edifices. The charitable buildings comprise the School for the Deaf, formerly the American Asylum for the Deaf and Dumb

(founded 1816), the oldest institution of its kind in America; Retreat for the Insane; Hartford Hospital; Hartford Orphan Asylum; Old Man's Home; Women's Christian Assoc.; and Union for Home Work. The Connecticut Humane Society has its head office here.

Industries.—Hartford is the centre of the leaf-tobacco trade of the Connecticut river valley. Beside its railroad connections, it has daily steamboat lines to New York, and freight lines to Philadelphia, Baltimore, and Albany. In 1900 Hartford reported 888 mfg. establishments, using a capital of $30,500,047, employing 13,363 hands, and yielding products valued at $31,145,715. This interest has been extended since, and several millions of Hartford capital are now invested in industrial works outside the city. The chief industries are the manufacture of fire-arms, Gatling-guns, steam-engines, boilers, sewing-machines, edge-tools, carpet, linen, silk, envelopes, carriages, water and car-wheels, silver-plated ware, and hardware, beside saw and flour-mills, marble works, railroad car and repair-shops, printing, lithographing, and book-publishing establishments. Aggregate cap. of local corporations was about $40,000,000. There are now six life companies, two of which also have accident branches—the latter being the original and chief department in one; five fire companies besides a county mutual, and the United States branches of three foreign companies; and a steam-boiler insurance company. There are 7 national and 5 other banks of discount, 4 savings-banks, and 4 trust companies.

Government.—The mayor holds office for two years, and the representative body is two chambered. The assessed valuation of property is about $81,000,000, making it *per capita* one of the richest cities in the United States. The tax rate is under 2 cents on the dollar.

History.—The site of Hartford—called by the Indians Sucklang—was permanently settled by emigrants from e. Mass. 1635, and first named Newtown. They found the Dutch in possession of a fort (erected 1633) at the junction of the Connecticut and Park rivers. In 1637 the name was changed to Hartford, as a compliment to the Rev. Samuel Stone, one of the first pastors of the settlement, who was born in Hartford, England. The first court in Connecticut convened there 1636, the first constitution was framed 1639, Jan., and the first assembly under it met 1639, May. Farmington was settled by emigrants from Hartford 1645, Middletown and Norwalk 1650, and Hadley, Mass. 1659. In 1654 the gen. court dispossessed the Dutch at the fort; 1687 the Charles II charter was saved from Gov.Gen. Andros by a timely strategy on the part of Capt. Joseph Wadsworth; 1775 a committee planned the expedition which captured Ticonderoga and Crown Point before the expedition authorized by congress started (see ALLEN, ETHAN; ARNOLD, BENEDICT; GREEN MOUNTAIN BOYS); 1784 the city was incorporated; 1665–1701 the legislature met in Hartford; 1701–1818 it held one session in Hartford and one in New Haven annually; 1819–75 it

held an annual session in the two capitals alternately; and since 1875 Hartford has been the sole capital. The famous convention of New England delegates (federalists) to protest against the war with England and other measures of the administration, was held here 1814, Dec .15—1815, Jan. 5. (See HARTFORD CONVENTION; also CONNECTICUT; *History*), Pop. (1910) 98,915.

HARTFORD, Mich., village of Hartford Township, Van Buren County, 15 miles west of Paw Paw on the Paw Paw river, and 17 miles northeast of Benton Harbor, on the Chicago & M. L. S. R.R. It has a graded school and five churches. It carries on a considerable traffic in agricultural produce and stock, has grain elevators, flour, saw, and planing-mills, canneries, electric light plant, and manufactures staves, cigars, cheese, vinegar, etc. Pop. 1,150. 1,077.

HARTFORD, Vt., town of Windsor County, on the White River, about one mile above its junction with the Connecticut River, and 60 miles south of Montpelier, on the Central Vt. and on the Woodstock R.R.'s. It has woolen, saw, and grist mills, and manufactures of agricultural implements and furniture. Pop. (1910) 4,179.

HARTFORD CITY, Ind., city, county-seat of Blackford County; on the Pittsburg, C. C. & St. L. and the Lake E. & W. R. R.'s; about 45 miles southwest of Fort Wayne, and 60 miles northeast of Indianapolis. The natural resources which contribute to the industrial and commercial interests are the products from the surrounding agricultural country, the natural gas supply, and the oil fields. The chief manufactures are iron, glass, flour, pulp, and paper, strawboard, and wagons. The city owns and operates the waterworks. Pop. (1910) 6,189.

HART'FORD CONVEN'TION, in the Political History of the United States: assemblage of delegates from the New England States, at Hartford, 1814, Dec. 15. This convention was proposed by the Massachusetts legislature. On the outbreak of the war with Great Britain 1812, the democratic party favored France, while the federalists inclined toward the side of England. As the war destroyed commerce and the fisheries, the chief interests of New England, which was also federalist in politics, there was disapproval of it in New England. The governors of these states protested that while their people were drafted into the army by conscription, their own coasts were left exposed and undefended. The ostensible object of the convention was to devise means of security and defense against British invasion. It sat 20 days with closed doors; and as it had been charged by political antagonists that its objects were treasonable, it was watched by a military officer of the government George Cabot of Massachusetts, was chosen president; the total number of delegates was but 25; 12 from Massachusetts, 7 from Connecticut, 3 from Rhode Island, 2 from New Hampshire, 1 from Vermont. The convention, at rising, proposed certain

amendments to the United States constitution—free (excluding slave) population as the basis of representation, a single term for the presidency, exclusion of foreigners from office, limitation of embargoes to 60 days, and requirement of a two-third vote in congress for admission of new states and for declaring war, etc. Certainly no treasonable act was committed, and doubtless no treasonable intention was entertained; yet the federalist party, whose great leader had been George Washington, never recovered from the odium of opposition to the government, and 'Hartford Convention Federalist' was long a term of reproach.

HARTFORD THEOLOGICAL SEMINARY, an institution founded in 1834 for the education of Congregational preachers, at East Windsor Hill, Conn. It was formerly called the Theological Institute of Connecticut, and took its present name on its removal to Hartford in 1865. Its control is vested in a board of trustees elected by the Pastoral Union, an association of 200 ministers who have subscribed to the creed of the Union. The aim of the institution is to train ministers for pastoral work on the broadest lines of intellectual and spiritual life. The seminary has always been a leader in theological pedagogy. In 1906 its faculty comprised 12 professors and 12 lecturers, and the number of students was between 80 and 90. It has a library of 85,000 volumes, and nearly 45,000 pamphlets. Hosmer Hall, the main building, was erected 1880 by James B. Hosmer, and as it is estimated, at a cost of $150,000. In 1902 the Case Memorial Library was built by Newton Case at a cost of $100,000. Since 1890 the faculty have issued their valuable theological quarterly, *The Hartford Seminary Record.*

HARTING, James Edmund, English naturalist: b. London 1841, April 29. He was a solicitor until 1878, since when he has devoted himself to zoological research. Among his numerous publications are: *The Ornithology of Shakespeare* (1871); *Handbook of British Birds* (1871); *Rambles in Search of Shells* (1875); *British Animals Extinct within Historic Times* (1880); *Essays on Sport and Natural History* (1883); *Glimpses of Bird Life* (1880); *Bibliography of Falconry* (1891); *Hints on the Management of Hawks* (1897); numerous articles in the *Encyclopedia of Sport* (1897–8); etc. He was editor of *The Zoologist* 1877–96. and of the natural history columns in *The Field* since 1870.

HARTINGTON, *hâr'tĭng-ton*, Spencer Compton Cavendish, ll.d., Marquis of: statesman: b. England, 1833 July 23, son of William, 7th Duke of Devonshire. He graduated at Trinity College, Cambridge, 1854, accompanied Earl Granville to Russia 1856, was elected to parliament as a liberal 1857, became a lord of the admiralty and under sec. of state for war 1863, was sec. of state for war 1866, Feb.—July, postmaster-gen. in Gladstone's cabinet 1868, Dec.—1871, Jan.; then became chief sec. for Ireland, and 1875, Feb. was chosen leader of the liberal party in the commons. 1879, Jan. 31, he was installed lord rector of

Edinburgh Univ., 1880 declined the queen's request to form a cabinet, 1880, May—1882, Dec. 16, was sec. of state for India under Gladstone, and 1882, Dec.—1885, June, sec. of state for war. In 1886 he declined to enter Gladstone's Home Rule cabinet and became leader of the unionist-liberals. He became 8th Duke of Devonshire in 1891. He was lord president of the council 1895–1903; chancellor of Cambridge University 1892; since 1892 has been lord-lieutenant of Devonshire.

HARTITE, n. *hâr'tīt:* a fosil resin found in the brown coal of lower Austria.

HARTLEPOOL, *hăr'tl-pôl:* municipal and parliamentary borough, seaport, and market-town of England, county of Durham, on a small peninsula, n. of the estuary of the Tees, 20 m. e.s.e. of Durham. It consists of one principal and several smaller streets, and was formerly surrounded by walls. The harbor is safe and easily accessible; extensive docks have been constructed. Fishing is here carried on with success. Hartlepool formerly attracted many visitors for sea-bathing during the summer months; but since its recent commercial revival, owing to the formation of railways connecting it with the coal-mines of Durham, it is no longer visited for that purpose. With W. Hartlepool the exports average annually in value $7,450,000; imports, $10,000,000. In 1901 the total tonnage entered and cleared, excluding those coastwise, was 881,978. The trade is chiefly in coal. As one of the Hartlepools, it joins in sending 1 member to parliament. Pop. of municipal borough, 22,700.

HARTLEPOOL, West: modern market-town and seaport of England, county of Durham, on the s. as Hartlepool is on the n. of Hartlepool Bay, practically forming one town with Hartlepool, but within the township of Stranton. It has sprung into existence within recent years, having been founded 1847 by the late Ralph Ward Jackson, enterprising railway speculator. It consists of one principal and several diverging streets, and possesses large and handsome churches, schools, several large hotels and dissenting chapels, a theatre, athenæum, and mechanics' institute, custom-house, market-house, exchange, a school of art, and other public buildings. The first harbor was constructed here 1847, of 12 acres and has since been greatly enlarged. The dock area of Hartlepool and West Hartlepool, together was 86 acres in 1906, but including the timber and ship-building yards, etc., the area covered was about 350 acres. There are also large graving-docks, timber-ponds, and about 3 m. of quays. Besides coal, the following are the principal imports: Flax and hemp, grain, timber, butter, cheese, fruit, cattle, tallow, yeast, iron, zinc, etc.; the exports consisting of woolen, cotton goods, copper, cement, drugs, machinery, earthenware, yarn, hides, etc.; the trade being carried on for the most part with the Baltic ports, Cronstadt, St. Petersburg, and Danzig, and with Hamburg and Rotterdam. The export of coal from the united port is about 1,500,000 tons annually. Of this

534,000 tons are exported coastwise, and 553,300 to foreign ports. Iron ship-building is carried on here; steam-vessels of considerable tonnage being built here. There are large iron-foundries, cement-works, locomotive engine and boiler-works, mast and block lofts, saw-mills, tile-works, and brick-fields. The Hartlepool boroughs consist of Hartlepool, West Hartlepool, Throston, Stranton, and Scaton Carew, and send one representative to the house of commons. Pop. 62,600.

HART'LEY, *hârt'lĭ*, Sir Charles Augustus, English civil engineer: b. Heworth, county of Durham, England, 1825. After being employed on several important engineering works he served in the Crimean war as captain of Turkish engineers, was knighted in 1862, and in 1867 was awarded, against 20 competitors, the prize for plans for extending the harbor of Odessa He was appointed by President Grant a member of a board of engineers to report on the improvement of the lower Mississippi and recommended the improvement of the South Pass of its delta. He has been consulting engineer on many other notable engineering projects and has received many medals and decorations from home and foreign societies. He has published *The Delta of the Danube; Public Works of the United States and Canada; Inland Navigation in Europe; History of the Engineering Works of the Suez Canal.*

HARTLEY, David, mental philosopher, founder of the English 'Associationist' school in psychology: 1705, Aug. 30—1757, Aug. 25; son of the vicar of Armley, Yorkshire. At the age of 15, he entered Jesus' College, Cambridge, and became a fellow of the college. He studied at first for the Anglican priesthood, but his independent thinking led him to dissent from some points in the Thirty-nine Articles, and he abandoned his original intention. Though in his mature years he impugned eternal punishment, maintaining the ultimate restoration of all men, his published opinions coincided with the Church of England, in which he continued to the last a member. He finally chose the profession of medicine; in which he attained eminence, practicing successively at Newark, Bury St. Edmunds, in London, and at Bath, where he died.

His work, *Observations on Man* (1749), on which his fame rests, was begun when he was about 25, and occupied his thoughts for 16 years. The first part relates to the constitution of the human mind, and is the really important and original part. The second part treats of religion and morals. His treatment turns throughout on two theories or hypotheses, of very different merits, and not necessarily conjoined, though never separated in his mind. The first is called the Doctrine of Vibrations, or a theory of nervous action analogous to the propagation of sound, the suggestion of which he owed to Newton, of whose writings he was a devoted student. His second and most valuable innovation consisted in showing that the faculties, powers, and feelings of the mind might be explained to a very wide extent by the principle of the association of ideas (see As-

SOCIATION OF IDEAS), a principle far from new, but never before appreciated in the range of its bearings upon the phenomena of mind.

The doctrine of vibrations supposed that when any one of the senses is affected by an outward object, the effect was to set the particles of the nerve in a vibratory motion, which ran along to the brain, and produced corresponding vibrations in the cerebral substance. In like manner, when an active impulse proceeded outward to the muscles, the manner of communication along the nerve was of the same kind. Hartley even extended these molecular vibrations to the other tissues. As a hypothesis, this assumption was so far legitimate, if it served to explain the facts, or even to imagine in a probable way what goes on in the substance of the nerves and brain during the processes of sensation, thought, and volition. The general distaste for this part of Hartley's speculations arose from a mistaken notion of its favoring materialism. Not only was the author not a materialist—being most express in affirming a spiritual entity different from the body—but his views had nothing more of materialism in them than the views that mankind have always held as to the connection of mind with bodily actions. In the free-will controversy he was a determinist. As regards the second doctrine of Hartley, the doctrine of association, he was certainly the first to do justice to the applications of that principle to explain the phenomena of the mind. He points out how it is involved in the conversion of our sensations into ideas, throughout all the senses, also in the origin of voluntary power, which he truly regards as essentially an acquired power. He then treats of the commonly recognized intellectual faculties,—Memory, Imagination, Reason, etc.—showing how widely the process of association pervades them all. Lastly, the Emotions, which he classifies under six heads—Imaginative Emotions, Ambition, Self-interest, Sympathy, Theopathy (the religious sentiment), and the Moral Sense—may be readily seen to be, in many instances, the products of association.

The last three of these he regards as arising from the former selfish emotions through association; and he argues, that, being derived last, they must be thought to be the more perfect, and hence, more binding. Later associationists, however, concluded that, since brain vibrations *attend* consciousness, they must *cause* it, and since altruistic are derived from selfish emotions, they must be less genuine. Consequently, though himself an idealist and altruist, Hartley became the founder of a school of materialists and egoists, and it is for this reason that his own views have been imperfectly understood. An invaluable commentary is *Hartley's Theory of the Human Mind on the Principle of the Association of Ideas*, by his follower, Joseph Priestley (1775).

HARTLEY, JONATHAN SCOTT, an American sculptor: b. in Albany, N. Y., 1845, Sept. 23; was educated at Albany Academy; early engaged in sculpture. His work includes

the Daguerre monument, Washington; Ericsson monument, New York; statue of Miles Morgan, Springfield, Mass.; statue of Alfred the Great, New Appellate Court Building, New York; statue of Thomas K. Beecher, Elmira, N. Y.; and many other public pieces. He was a member of the National Academy of Design; National Sculpture Society; Society of American Artists; Architectural League; and President of the Art Students League.

HARTMANN, *hârt'mân*, Karl Robert Eduard von, German philosopher: b. Berlin, 1842, Feb. 23; d. 1906, June 6. He was educated in the Berlin Gymnasium and the Royal School of Artillery, became an officer in the army 1861, and after serving a year met with an accident from the effects of which he was almost wholly confined to his bed afterward. In this condition he applied himself to literary pursuits, published several poetical productions, and attracted wide attention in the world of philosophy by *The Philosophy of the Unconscious* (1868, which was followed by *The Ethical Consciousness*), at first entitled *Phenomenology of the Ethical Consciousness* (1879); *The Philosophy of Religion* (2d ed. 1888); and *Æsthetics* (1886–7). These constitute his exposition of a system of philosophy. Among other works of his are: *Critical Grounds of Transcendental Realism*; *The Crisis of Christianity in Modern Theology* (1880); *Judaism in the Present and the Future* (1885); *Lotze's Philosophy* (1888); *The Ghost Theory in Spiritism* (1891); *The Fundamental Social Questions* (1894); and many other works on society, religion, etc. In his chief work he sought to corroborate philosophy by the inductions of physical science, and affirmed that the first principles are to be found in the unconscious, which is active in the instinct, love, emotions, formation of language, thought, etc. In detail he argued that the unconscious in nature has both a will and an idea, not the blind will of Schopenhauer nor the logical idea of Hegel; but a will that can determine itself to prototypal ideas, and an idea that can grasp reality by the action of will.

HARTMANN VON DER AUE, *hârt'mân fon dĕr ow'ĕh*, or Von Aue, Swabian kinght, one of the old German poets: b. about 1170; d. between 1207 and 20. He had probably begun the study of grammar, knew French when he joined the Crusade 1197, and, as he himself says, could obtain by his own reading, material for his narrative poems. Of these the first was *Erec* (the legend reproduced in Enid of Tennyson's *Idylls of the King*), written shortly before 1197, and edited by Haupt (1839); the last was *Iwein*, written before 1204; and edited by Benecke and Lachmann (1827, 2d ed. 1843); with a dictionary by Benecke (1833). Both of these are drawn from the Arthurian cycle of legends; and their natural development of events shows better mastery of their material than the more incoherent British narratives which form their basis. Between the composition of these two poems, Hartmann wrote the religious legends *Gregor auf*

dem Steine (ed. by Lachmann, 1838), read in churches till the 16th c., and *Der Arme Heinrich* (Longfellow's *Golden Legend*), edited by W. Müller (1842), also with Hartmann's *Lieder und Büchlein*, by Haupt (1842.) All these works have been translated into modern German.

HARTO'GIA: genus of trees or shrubs, of nat. ord. *Celestraceæ*. *H. Capensis*, native of the Cape of Good Hope, is only 10 or 15 ft. high, but the trunk is 12 to 18 inches in diameter. The wood is hard, fine-grained, close, and tough, it is much valued, and, when polished, is superior to the finest mahogany, and is often used for veneering. The Dutch colonists call it *Ladlewood*, probably from one of the first uses to which they found it convenient to apply it.

HARTRANFT, *hâr'trănft*, Chester David, American educator: b. Frederick Township, Montgomery County, Pa., 1839, Oct. 15. He was graduated at the University of Pennsylvania in 1861 and the New Brunswick Theological Seminary in 1864; was pastor of the Dutch Reformed church at South Bushwick, N. Y., in 1864-6, and of that in New Brunswick, N. J., in 1866–78. In 1879 he was appointed professor of ecclesiastical history at the Hartford Theological Seminary; in 1888 was elected its president, and held the chair of Biblical theology 1892–7 and of ecclesiastical dogmatics from 1897. He is a writer on theological subjects, and was at one time president of the Conservatory of Music at New Brunswick, N. J.

HARTRANFT, John Frederick: 1830, Dec. 16—1889, Oct. 17; b. New Hanover, Pa.: soldier. He was admitted to the bar 1859; served the first 3 months of the civil war as col. of the 4th Pennsylvania vols.; was in the first battle of Bull Run; on the staff of Gen. William B. Franklin; raised the 51st Pennsylvania vols.; and was appointed col. 1861, July 27. He accompanied the Burnside expedition to North Carolina; led the attack on Roanoke Island 1862, Feb. 7, and in the Newbern battle Mar. 13; was engaged in the second battle of Bull Run and Chantilly, led the charge at Antietam that carried the stone bridge and the one against the intrenchments at Fredericksburg; was ordered to Kentucky, took part in the successful defense of Knoxville, commanded a brigade before Vicksburg and in the Richmond campaign in the battles of the Wilderness and Spottsylvania; was promoted brigadier-general 1864, May 12, served through the Petersburg campaign, and for recapturing Fort Steadman 1865, Mar. 25, was brevetted maj.gen. After the war he declined a colonelcy in the regular army, was elected auditor-general of Pennsylvania as a republican 1865,68, governor 1872, 75, and major-general commanding N. G. S. Pennsylvania 1879, and was appointed postmaster of Philadelphia 1879, and collector of the port 1880.

HART'S, (or Spectacle) Island: in Long Island Sound, between Sands Point and Pelham Neck; belonging to New York City, and in Rye tp., Westchester co. It was a mili-

tary rendezvous during the civil war, and contains a monument to the Union soldiers buried there, a branch of the lunatic asylum, branch of the co. workhouse, hospital, and cemetery in which the unknown and paupers are buried.

HARTSHORN. See HART; AMMONIA.

HART'S'- TONGUE (*Scolopendrium*): genus of ferns, of which one species, *S. vulgare*, is found in moist woods, shady banks, caves on the seashore, and other cold and damp situations in Europe and N. America. It differs in appearance from many other ferns, its fronds being in general quite undivided—though sometimes, by monstrosity, they are forked and even multipartite—linear, from a few inches to two ft. in length, and from an inch to two or three inches in breadth. The *soir* are in transverse lines, on the lateral nerves. Fine plants of this fern have a very ornamental appearance, and are in their greatest luxuriance in winter.

HARTSUFF, *hârt'sŭf*, GEORGE LUCAS: 1830, May 28—1874, May 16; b. Tyre, Seneca co., N. Y.: soldier. He graduated at the U. S. Milit. Acad. 1852; was asst. instructor of artill. tactics there 1856–59; appointed asst. adj.-gen. and capt. 1861; promoted maj. U.S.A., appointed brig.gen. of vols., and promoted maj.gen. of vols. 1862; was a member of the board to prepare a code for the govt. of armies in the field and to revise the rules and articles of war; promoted lieut.col. and asst.adjt.gen. U.S.A. 1864; commanded the siege works in front of Petersburg 1865, Mar., Apr.; brevetted brigadier-general and major-general U.S.A. 1865, Mar. 13; and retired on full rank of major-general for disabilities resulting from wounds in battle 1871, June.

HARTT, CHARLES FREDERICK: 1840, Aug. 23—1878, Mar. 18; b. Frederickton, N. B.; naturalist. He graduated at Acadia College, Wolfville, N. S. 1860, studied the geology of New Brunswick, attracted the attention of Prof. Louis Agassiz who invited him to the Cambridge Museum of Comparative Anatomy 1862, was on the geological survey of New Brunswick 1864, accompanied the Thayer expedition to Brazil 1865, elected professor of natural history in Vassar College and of geology and physical geography in Cornell Univ. 1868, made exploring trips to valley of the Amazon 1870–1, planned a Brazilian geological commission 1874, and was chief of the geological surveys of the empire from 1875, May, till death. He published *Geology and Physical Geography of Brazil* (Boston 1870), and *Contributions to the Geology and Physical Geography of the Lower Amazons* (Buffalo 1874).

HARTWICK, *hârt'wĭk*, Ger. *hart'vĭk* (or HARTWIG, *hârt'wĭg*, Ger., *hart'vĭg*), JOHN CHRISTOPHER: 1714–1796, July 17; b. Saxe-Gotha, Germany: Lutheran minister. He studied in the Univ. of Halle, engaged in missionary work among the Jews 1739, was ordained in London 1745, Nov. 24, and came to America to take charge of scattered Lutheran congregations 1746. He assisted in organizing

the first Lutheran synod in America at Philadelphia 1748, preached in N. Y., Penn., Md., Va., Me., and Mass.; purchased a large estate from the Mohawk Indians, and in his will directed that it should be used to establish a college and theol. seminary. The town of Hartwick was built on his land, in Otsego co., N. Y., and the Hartwick Theol. Seminary was opened there 1815.

HARTY, *hâr'tĭ*, JEREMIAH J., American Catholic prelate: b. St. Louis 1853, Nov. 5. He was graduated from the St. Louis University in 1872, and took a theological course at St. Vincent's College, Cape Girardeau, Mo. He was ordained priest in 1878, and appointed assistant pastor of St. Bridget's parish in St. Louis, holding this position until 1888, when he was commissioned to build the church and organize the parish of St. Leo in the same city. His organizing work has been most successful, and in 1902 he built a school accommodating over 700 children. In 1903 he was appointed archbishop of Manila, the most important see in the Philippines.

HARTZ'ELL, *hârt'zĕl*, JOSEPH CRANE, American Methodist bishop and missionary: b. Illinois 1842, June 1. He was graduated from Wesleyan University and Garrett Biblical Institute (Evanston, Ill.), and in 1896 was elected missionary bishop to Africa where he has since been actively engaged in organizing missions. In June of 1903 he sailed from New York on his seventh missionary tour of inspection in Africa.

HARTZENBUSCH, *harts'ĕn-bûsh*, JUAN EUGENIO: Spanish dramatic poet of German extraction: b. Madrid, 1806, Nov. 6. He studied under the Jesuits, and produced his first work, *Amantes de Teruel*, 1836. His principal works since then, all published at Madrid, are *Dona Mencia* (1838); *La Redoma Encantada* (1839); *La Visionaria* (1840); *Alfonso el Casto* (1841); *Primero Yo* (1842); *Honoria* (1842); *El Buchiller Mendarias* (1842); *La Coja y el Encogido* (1843); *La Madre de Pelayo* (1846); and *El mal Apostol* (1864). He has published also prose works: *Cuentos y Fabulas* (1861); *Obras Escogidas* (1865); and *Obras de Encargo* (1864). His writings are characterized by glowing imagination, vigorous diction, and sonorous versification. He d. 1880, Aug.

HARUGARI, *hâr ô-gâ'rĭ:* German social and benevolent order, established in the United States 1847, provided with national, grand (state), and subordinate lodges, and numbering over 30,000 members. It publishes an organ, *Deutschen Eiche*, strives to preserve the purity of the German language, and contains some of the most intelligent and progressive Germans in the United States.

HARUM-SCARUM, a. *hă'rŭm-skă'rŭm* [OE. *hare*, to terrify; Eng. *scare*, to strike with sudden terror]: unsettled; rash; giddy; flighty.

HARÛN, *hâ-rôn'*, surnamed AL-RASCHID (i.e., Aaron the Orthodox): fifth Abbaside caliph of Bagdad, the most renowned of that line; 763 or . –808 or 9 (reigned 786–

808 or 9). He succeeded his elder brother, Haudi, in the caliphate. Various insurrections in the interior of the kingdom were speedily put down, and the wars against the Byzantines and the Chasars brought to an end. His vast empire extended from the Caucasus to the sources of the Nile. Harun gave himself up to the pleasures of life, leaving the entire administration of his kingdom in the hands of Yahya the Barmecide, and his four sons; and the energy of their administration, the enforcement of order, and the general prosperity of the country proved that his confidence was not misplaced. His capital, Bagdad, he rendered the most flourishing city of that period Tribute was paid to him from all quarters, and splendid edifices were erected by him at an enormous cost He was the patron of learning, poetry, and music, and his court was the resort of the most eminent Mohammedans of the age. He was celebrated in countless songs and narratives, and is the hero of several of the stories in the *Arabian Nights*. Toward the end of his reign, he conceived a deep hatred toward the Barmecides (see BARMECIDES), probably through jealousy at their increasing power; yet so well did he know their fidelity, that he suffered the reins of government to remain in their hands some years until it came to his knowledge (803) that Jaafer, the vizier's son, had secretly married his sister. Harun immediately caused his sister to be put to death, with Jaafer, who had been his favorite and companion in his nocturnal rambles through the streets of Bagdad. The vizier and nearly all his family met the same doom. On the destruction of this family, Harun's affairs fell into confusion; treason and rebellion, no longer dreading the far-reaching arm of the able vizier, showed themselves in various quarters. The most formidable of these insurrections having broken out in Khorassan, in the n.e. of the empire, Harun marched in person against the rebels. But an attack of apoplexy arrested him in Tûs, where he soon died. The tales of the *Arabian Nights* have thrown a false halo round his memory, for though he was undoubtedly the most cultivated monarch of the age, yet, like the most of the Abbaside race, he could, when it suited him, act to perfection the part of the avaricious and bloody tyrant.

HARUSPICE, n. *hă rŭs′pĭs* [L. *haruspex*, a soothsayer—from Skr. *hira*, an intestine; L. *specĭō*, I inspect: by some supposed an Etruscan corruption of Gr. *hieroskopos;* by others, fr. *haruga*, victim, and *specio*, I see]: in *anc. Rome*, one who pretended to foretell future events by inspecting the entrails of animals sacrificed. HARUS′PICY, n. *-pĭ-sĭ*, the art of foretelling future events by the inspection of the entrails of animals. The *Haruspices* seem to have come originally from Etruria, whence the Romans derived many of their religious institutions. Their art, *haruspicina*, which in many respects was like that of the augurs (see AUGURIES AND AUSPICES), consisted in interpreting the will of the gods by inspecting the entrails of the animals offered in sacrifice (hence they are called also *extispices*),

and by observing other circumstances of the offerings, such as the willingness or unwillingness of the victim to come to the altar, the flame, the smoke, etc. They took indications also from earthquakes, lightning, and all other extraordinary phenomena of nature called *portenta*. The haruspices did not equal the augurs in dignity and respect; they were regarded rather as *media* of communication with heaven, than as possessing any independent religious authority. They had no organization, like the augurs; they did not, in earlier times at least, form a *collegium*, nor had they a *magister*. They were, however, at one time considered of great importance; but latterly their art fell into disrepute with the more intelligent Roman citizens. The art of the haruspices was finally abolished by Constantine. Their sacred books were called *libri haruspicini fulgurales*, and *tonitruales*.

HARVARD, *hâr'vard*, JOHN: 1607, Nov.—1638, Sep. 24; b. Southwark, London, England: founder of Harvard College. He graduated at Emmanuel College, Cambridge, England, 1635; married and came to America 1637, was made a freeman of Mass. and given a tract of land in Charlestown, where he began preaching as a Congl. minister, and in his will bequeathed £750 and 320 volumes from his library for the establishment of a college. A granite monument was erected over his remains in Charlestown 1828, and a memorial statute on the Delta at the univ. was unveiled 1884.

HAR'VARD UNIVERSITY: at Cambridge, Mass.; oldest educational institution in the United States. It was established by order of the gen. court of the colony of Massachusetts Bay, which voted 1636, Oct. 28 to give £400 toward a school or college, one-half the amount to be paid the following year, the remainder on the completion of a suitable building. In 1637 the gen. court decided that the building should be located at Newtown. The following year John Harvard (q.v.) bequeathed £750 and his library of 320 selected vols. to the college, whereupon the gen. court voted that the institution should be known as Harvard College and changed the name of its site from Newtown to Cambridge in honor of the great English university town. John Harvard's bequest stimulated interest in the projected institution, and within a brief period, subscriptions, legacies, and gifts in great variety began to be received. Under the original act of the gen. court the gov of the institution was vested in a board consisting of the gov. and dep.-gov. of the province, the magistrates of that particular jurisdiction, and all the ministers of the churches of Cambridge, Watertown, Charlestown, Boston, Roxbury, and Dorchester. In 1650 the institution was chartered as a corporation under the title of 'The President and Fellows of Harvard College,' and 1780 its rights and privileges were confirmed by a special section in the constitution of Mass., which added to the governing board the members of the governor's council and of the senate, and restricted the ecclesiastical representation to the pastors of the Congl.

churches in the towns named. A further change was made 1812, when the pres. of the senate and speaker of the house were substituted for the entire senate, and the ecclesiastical representation was enlarged to 15 Congl. ministers and 15 laymen chosen from the colony at large instead of from the six towns. In 1834–43 there was an agitation to extend the ecclesiastical representation to all denominations and the plan was agreed to in the latter year. Again, 1851 the sec. of the state board of education was substituted for the governor's council, and the 30 elective members of the board—15 clergymen and 15 laymen—were divided into three classes of 10, one-third to be chosen each year by joint ballot of the senate and house of representatives. The final act in the disestablishment of the college from the state was authorized 1865, Apr. 28, when the state surrendered its 5 ex-officio memberships in the board and vested in the alumni the right to elect 30 of themselves—5 each year for a 6 years' term—under prescribed regulations. Thus the present governing authority was evolved, the pres. and treas. of the corporation and the board of 30 overseers. The latter have general jurisdiction over the internal administration of the institution, but no voice in the investment of its funds. Beside the corporation and the board of overseers, there is an academic council; composed of the pres., professors, and asst. and adjunct professors, whose special function is to recommend to the corporation such candidates as they may deem worthy to receive the higher degrees of the institution.

The first class was formed 1638 and taught two years by Nathaniel Eaton. In 1640 the Rev. Henry Dunster, of England, was chosen the first pres., and 1642 the first class (9) graduated. The first printing press in the colony was set up in Pres. Dunster's house, and on it were first printed *The Freeman's Oath*, an almanac, and Dunster's improved versification of the psalms known as the *Bay Psalm Book*. Numerous small donations of books were received from time to time, and 1677 the college acquired the noted library of Theophilus Gale, theologian and philologist. The first of the halls—Harvard—was erected 1682, used also by the gen. court, destroyed by fire 1764, and rebuilt 1766. It was the receptacle of the collection of books till Gore Hall was built. The second hall was built by Lieut.-Gov. Stoughton 1699; it lasted till 1780, and was succeeded by a new building also bearing his name 1805. In 1719 Thomas Hollis, London merchant, began his generous donations, which provided professorships of divinity and of mathematics and natural philosophy, and a large number of books for the library. The Hollis family continued promoting the interest of the college to the fourth generation. In 1751 Paul Dudley, eminent jurist, founded the first endowed series of annual lectures; and 1761 the college attained wide repute by publishing the celebrated *Pietas et Gratulatio* on the death of George II. and the accession of George III.

In 1764 the college met with a serious loss by fire; the

first Harvard Hall, containing the library and apparatus, was entirely destroyed, but the loss was repaired to some extent by the generous aid of the Colonies.

Between 1636 and 1782 Harvard College conferred only the degrees of bachelor and master of arts, but in 1780 the term university was applied to it in the Constitution of the State of Massachusetts. In 1782 and 1783 three professorships of medicine were established, and the first degree of bachelor of medicine was conferred in 1788. In 1810 the lectures in medicine were transferred to Boston, and there the first Medical College was built. The law school was established in 1817, and it has the distinction of being the earliest school of law in the country connected with a university and authorized to confer degrees in law. The divinity school was a gradual outgrowth of the college; the Hollis professorship of divinity, which has been mentioned, was established in 1721, but the divinity faculty was not formally organized until 1819. It is now undenominational. The schools of medicine, law and divinity are the three oldest additions to the college proper, and it was decided that such an institution, having 4 schools and several departments, justified the title, university. The Society for the Collegiate Instruction of Women began the work (1869) of providing ways and means for giving young women an opportunity to obtain a collegiate education. The name of the organization was changed in 1894, by the general court of Massachusetts to that of Radcliffe College (q.v.). Systematic collegiate instruction is now given in this college, under the professors and teachers of Harvard University. The requirements are the same as for admission to the university.

Charles William Eliot (q.v.) was elected president in 1869. At this time the departments were almost independent schools, to which no entrance examinations were required; but the students were largely from classical preparatory schools, the majority of which were located in New England. The college required certain courses, and all demanded good work and a high degree of scholarship before graduation. In four years, so rigorous and thorough had been the work of President Eliot, that practically a reorganization had been made, the departments had been correlated, and individual work had been given recognition.

The schools and departments of Harvard University now comprise; (1) Harvard College, the Lawrence Scientific School, and the Graduate School, established in 1872 for students making original research. The Scientific School was established in 1847 as an advanced school in science and literature; later the name was changed to Lawrence Scientific School, in honor of Abbott Lawrence who presented it with $50,000. Those three schools, which include 14 departments offering elective courses, were placed, in 1890, under the charge of the faculty of arts and sciences.

For the students of this school who are engaged in original investigations there is available a number of

fellowships, at present 58, which are from $200 to $1,000. The Edward Austin Fellowship and the Austin Teaching Fellowship are given only to resident graduate students. (2) The law school has been mentioned. (3) The divinity school, already noticed. (4) The medical school, founded in 1782, and the dental school, established in 1867, were united in 1899 and are in charge of the faculty of medicine. The school is located in Boston. The new buildings for the medical school, opened at Brookline in 1906, are second to none other in the world. There are seven separate buildings, the central structure and two of the side pavilions were provided for by a gift of $1,000,000 from J. Pierpont Morgan, and $1,000,000 from other friends. The site comprises 26 acres about three miles from the main buildings of the university in Cambridge (5) The Bussey Institute, a school of agriculture and horticulture, was established in 1870 in accordance with the will of Benjamin Bussey. It is at Jamaica Plain, in the southwestern part of Boston. (6) The Arnold Arboretum, established in 1872, is devoted to scientific research in forestry, dendrology, and arboriculture. It was founded under the will of James Arnold. It is practically a large park containing about 220 acres, and is located in West Roxbury. (7) The astronomical observatory was established in 1843 by means of a public subscription. The Sears Tier was built in 1846, and two years later Edward Bromfield Phillips bequeathed to the university the sum of $100,000 for the observatory; this early bequest has since been supplemented by many others, so that the observatory now has an endowment of about $900,000. It has a director and four other professors and 40 assistants. A branch station is established on a mountain 8,000 feet high, near Arequipa, Peru The annals of the observatory fill about 50 volumes. Among the more important instruments are the 15-inch and 6-inch equatorial telescopes, the 8-inch transit-circle, the 11-inch Draper photographic telescope, the 8-inch photographic telescope, and the meridian photometer. A grant was made in 1903 by the Carnegie Institution, for the study of the collection of photographs at the Harvard Observatory (8) The university library, including the libraries of the schools and departments, contains about 673,394 volumes, and 393,892 pamphlets. (9) The Gray Herbarium, so named because it contains the Herbarium of Asa Gray (q.v.), presented to the university in 1864. (10) The university museum is made up of the following collections: the Peabody Museum of American Archæology and Ethnology; the Museum of Comparative Zoology, established in 1859 by private subscription, State aid, and the collection of Louis Agassiz, and valuable gifts from his son; the Mineralogical Museum, established in 1890–1; the Semitic Museum, completed in 1902; the William Hayes Fogg Art Museum, completed in 1895; and the Germanic Museum, established in 1902. (11) The botanical garden, established in 1809, covers about seven acres and contains thousands of plants for scientific study

The university summer school gives short courses of study under the charge of a committee of the faculty of arts and sciences, and is held in the college buildings during the summer vacation. The school is popular and has had a large attendance each year. Atheletics are provided for—two fields of 24 acres each and the Lenox gymnasium furnish opportunities for physical training. The stadium erected on Soldiers' Field has a seating capacity of about 30,000. It is shaped like the letter 'U,' with the open space toward the Charles river. It is of steel and concrete construction. The mezzanine floor under the seats, the promenade above the seats, the stairs, the perfect arrangement of all the parts make this stadium a model of construction. It was built under the auspices of the class of '79. A club house, called the Harvard Union, was donated by Henry Lee Higginson in 1901 The Phillips Brooks house is used for religious meetings In 1903 Harvard received a valuable collection of plaster replicas of Germanic art; a number of them were given by Emperor William III. of Germany. Among them is a replica of the equestrian statue of the Great Elector, by Schülter, one of Frederick the Great, by Schadow, a cast of the golden gate of the Cathedral of Freiburg, the bronze door of Hildesheim Cathedral, on which is the Biblical story of Creation, the wood screen of Naumburg Cathedral, and several other reproductions of great value.

The university has now about 60 buildings. In 1904–5 the number of members of the corporation was six; of overseers, 30; of professors and instructors composing the faculty, 525; of students in all the schools and departments, 5,143. In 1904 the invested funds of the university amounted to $16,755,753.10; and the grounds, buildings, and apparatus were estimated to be worth about $21,000,000: the annual income was $1,572,539.50; and bequests and gifts amounted to $1,509,563.76. Harvard has had 22 presidents, including the present incumbent Charles William Eliot. Following is the roll of the presidents with their terms of service: Henry Dunster, 1640–54; Chas. Chauncy, 1654–72: Leonard Hoar, 1672–75; Urian Oakes, 1675–82; John Rogers, 1682–84; Increase Mather, 1685–1701; Samuel Willard (acting), 1701–7; John Leverett, 1708–24; Benjamin Wadsworth, 1725–37; Edward Holyoke, 1737–69 Samuel Locke, 1770–73; Samuel Langdon, 1774–80; Joseph Willard, 1781–1804, Samuel Webber, 1806–10; John Thornton Kirkland, 1810–28; Josiah Quincy, 1829–45; Edward Everett, 1846–49; Jared Sparks, 1849–53; James Walker, 1853–60; Cornelius Conway Felton, 1860–62; Thomas Hill, 1862–68; and Charles William Eliot.

There are 13 periodicals which represent the interests of the university as a whole, and of special schools and departments.

Consult: Quincy, *The History of Harvard University;* Thayer, *Historical Sketch of Harvard University;* Hill, *Harvard College by an Oxonian;* Peabody, *Harvard Graduates Whom I Have Known;* Bush, *History of Harvard;*

Eliot, *A Sketch of the History of Harvard University,* Thayer, *History of Middlesex County.*

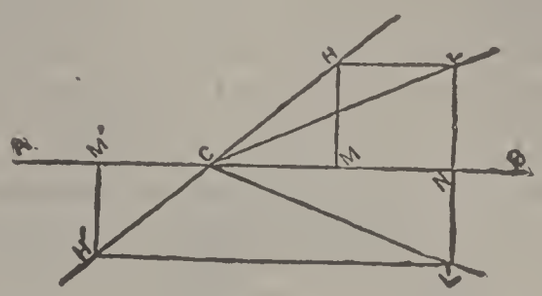
HARVEST, n. *hâr'vĕst* [AS. *hærfest;* Ger. *herbst,* harvest, autumn: Dut. *herfst,* autumn: Icel. *haust,* autumn]: the time of reaping and gathering in corn or fruits; the corn, grain, or fruits gathered: the produce of labor; consequences of actions; V. to reap and gather in. HAR'VESTING, imp.: N. act of collecting the harvest. HAR'VESTED, pp. and a. reaped and collected, as ripe corn. HAR'VESTER, n. *-ẽr,* one who. HARVEST-HOME, feast at the close of the harvest, or song sung at it. HARVEST-QUEEN, a representation of Ceres carried about at the close of the harvest.

HAR'VEST BUG (*Leptus autumnalis*): a sort of mite, a minute animal of the *Acarus* tribe, which attacks laborers in harvest fields. Its popular name is a misnomer, as it is not one of the *Insecta.* As the acari in their perfect state are usually provided with eight feet, and in their larval stage with only six feet, and as the harvest-bug has only the latter number, it was suspected by Siebold, and it has been since proved, that this animal is the larva of one of the Trombidida, a family of Acaridans. It is so minute, that, were it not for the brilliancy of its color, a vivid crimson, it would be invisible. It makes its presence known about the middle of July, and disappears toward the middle of Sep.; and is most plentiful in hot dry seasons. It occurs on the blades of grass, and on various plants in fields, gardens, and woods, and attacks not only man, but the dog, cat, etc. Persons with delicate skins are its special prey, and it seems to prefer the legs, the under part of the thighs, and the lower part of the abdomen. The wound that it inflicts—how produced is not well understood—occasions great irritation, which usually leads the victim to scratch, and thus to increase the inflammation. The skin becomes swollen and red, sometimes even purple; and the minute vesicles caused by these animals sometimes terminate in suppuration.

HAR'VEST-FLY: popular name in the United States for common species of *Cicada* (q.v.) which make their appearance as winged insects in the season of harvest. *C. septemdecim* is called the *Seventeen Years' Locust,* from a belief that it lives for that period in its larval state, a belief which seems verified so far at least as that there is a periodicity in the appearance of these insects, observed to be at intervals of about 17 years. See CICADA (*C. septemdecim*).

HAR'VEST MOON: popular name for the moon which in certain latitudes, occurs full nearest the autumnal equinox (Sep. 23): the moon then rises for several days nearly at sunset, and about the same time by the clock, instead of rising, as it usually does, 52′ later on one day than on the preceding. It thus gives the farmer on several evenings in his busy harvest season light sufficient to continue his work after sunset. This phenomenon is owing to the fact, that at this time the moon is in Aries, when the part of the

ecliptic below the horizon makes the least angle with it, as shown in the following figure, where AB represents a portion of the equator; H′CH, a portion of the horizon; CL, a portion of the ecliptic when C represents the equinoctial point of Aries; CL′, a portion of the same if C were the



equinoctial point of Libra. Then (supposing the moon to move in the ecliptic, a supposition not far from the fact, and one which greatly simplifies the explanation of this phenomenon), if the moon be at C (point of Aries) on one night, it will have retrograded to L by the same time on the following night; and, by the revolution of the earth in the direction NM′, will appear on the horizon at H, and the distance LH reduced to time will give the moon's retardation. If C be the equinoctial point of Libra, then L′ will be the moon's position on the second night, and it will rise at H′ after the earth has revolved so as to carry the whole of the line H′L′ above the horizon; this line, when reduced to time, gives the retardation. Hence, as the moon when at the full is in Aries at the sun's autumnal equinox, and in Libra at the sun's spring equinox, the retardation is least in the first instance and greatest in the second, being respectively CN—CM, and CN + CM′=CN + CM. In the latitude of Edinburgh (55° 58′), the greatest retardation is 1 hour 8′ 24″, and the least 11′ 44″; in lat. 64° 27′, the least retardation is zero, or the moon rises at the same time on two successive evenings, while at the arctic circle (67° 30′) it rises 4′ earlier on the second evening. As the moon's orbit is inclined to the ecliptic, this irregularity will be increased or diminished according as the ascending node is between Capricorn and Cancer, or between Cancer and Capricorn. It is nothing at the equator, increasing as we go north.

HARVEY, *hâr′vĭ*, Ill., city in Cook County; on the Cleveland, C., C. & St. L. and the Illinois C. R.R.'s; south of Chicago, about seven miles from Blue Island. It was founded in 1891 and incorporated in 1892. Its proximity to Chicago gives it the advantages of a residential city and its railroad facilities are an aid in the development of its manufactories. Some of the chief industrial establishments are railroad supply shops, an automobile factory, gas-stove factories, machine-shops in which are manufactured ditching and mining machinery. The trade is principally in its manufactures and agricultural products. Pop. (1900) 5,395.

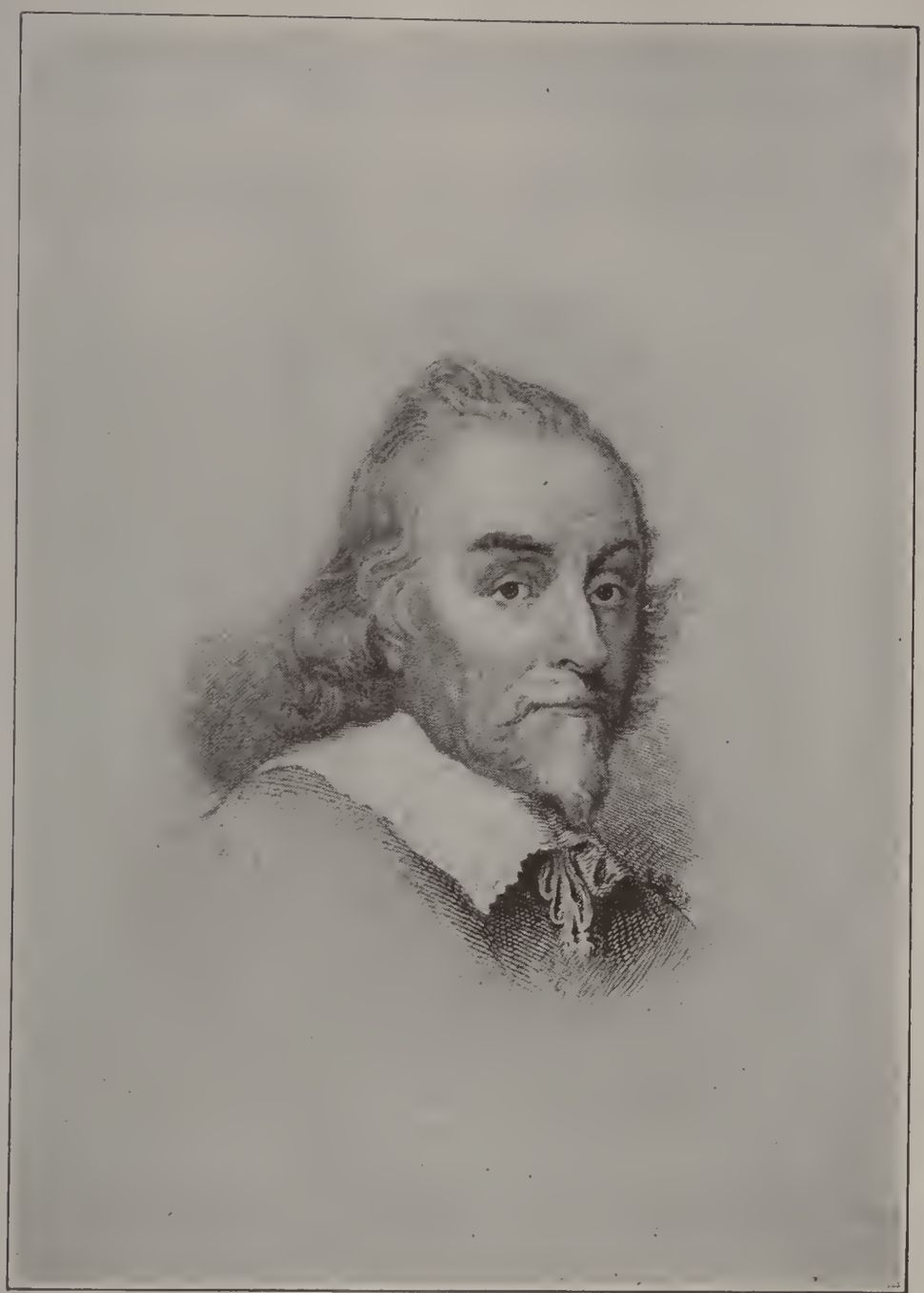
HARVEY, *hâr'vĭ*, Sir George, p.r.s.a.: 1806, Feb.—1876, Jan. 22; b. St. Ninians, near Stirling, Scotland: painter. At the age of 18 he was placed in the school of the Trustees' Acad., Edinburgh. In 1826, when the Royal Scottish Acad. was instituted, he was elected an associate, and 1829 an academician. He was a constant contributor to the Academy's exhibitions, and many of his works are well-known through the medium of engravings. The principal are—*Covenanters Preaching, Battle of Drumclog, The First Reading of the Bible in Old St. Paul's, The Curlers, Columbus Discovering America,* and *Quitting the Manse.* Harvey did not confine himself to historical art, some of his most successful works being representations of Scotch scenery. His landscapes are remarkable for pastoral peace, and some of the more imaginative for a singular solemnity of atmospheric effect. He was elected pres. of the Royal Scottish Acad. 1864, and knighted in 1867. He died at Edinburgh.

HARVEY, George Rossiter McClellan, American publisher and editor: b. Peacham, Vt., 1864, Feb. 16. After a secondary education, he became a reporter successively for the Springfield (Mass.) *Republican,* the Chicago *News,* and the New York *World,* was for a time managing editor of the *World,* and later a constructor and president of various electric railways. He purchased and became editor of the *North American Review* in 1899, and in 1900 received the presidency of the reorganized firm of Harper and Brothers, publishers.

HARVEY, Moses, Newfoundland historian: b. Armagh, Ireland, 1820, March 25; d. St. John's, Newfoundland, 1901, Sep. 3. He was graduated at Queen's College, Belfast, in 1840; later studied theology; and was ordained in the Presbyterian Church. He was pastor of the Free Presbyterian Church, St. John's, Newfoundland, 1852–78, when he retired from the ministry and devoted himself to literary and scientific studies, and became popular as a lecturer. He published *Thoughts on the Poetry and Literature of the Bible* (1853); *Lectures on the Harmony of Science and Revelation* (1856); *Newfoundland, the Oldest British Colony* (1883); *Text-Book of Newfoundland History;* etc. He also contributed articles to the Encyclopædia Britannica on Newfoundland, St. John's, Labrador, and the seal fisheries of the world.

HAR'VEY, William, m.d.: discoverer of the circulation of the blood: 1578, Apr. 1—1657, June 3; b. Folkestone, Kent, England. His father was a yeoman; and five of his brothers were merchants of weight and substance, *magni et opiosi,* in the city of London, while the sixth sat as member of parliament for Hythe.

After six years' attendance at the grammar-school at Canterbury, Harvey, then 16 years of age, was entered at Caius College, Cambridge. He took his first degree in arts 1597, and having selected physic for his profession, left Cambridge about 1598, and went to the Univ. at Padua, then



HARVEY.

the most celebrated school of medicine in the world. Having passed five years in attendance on the lectures of Fabricius de Aquapendente, Julius Casserius, and other eminent men, who then adorned that university, he obtained his diploma as doctor of medicine 1602. He returned to England in the same year; and after receiving his doctor's degree from his original university, Cambridge, settled in London as a physician. In 1609 he was appointed physician to St. Bartholomew's Hospital, and 1615 Lumleian Lecturer at the College of Physicians—an office then held for life; and it is generally supposed that in his first course of lectures (in the spring of 1616) he expounded those original and complete views of the circulation of the blood with which his name is indelibly associated. It was not till 1628 that he gave his views to the world at large, in his celebrated treatise entitled *Exercitatio Anatomica de Motu Cordis et Sanguinis* (4to, Franc.), having then, as he states in the preface, for nine years or more gone on demonstrating the subject in his college lectures, illustrating it by new and additional arguments, and freeing it from the objections raised by skilful anatomists. Shortly after Harvey's election as Lumleian Lecturer (1617 or 8), he was appointed physician-extraordinary to James I., and in the beginning of 1630 was engaged 'to accompany the young Duke of Lennox in his travels beyond seas.' In 1632, he was formally chosen physician to Charles I.; and 1633 we find that his absence, 'by reason of his attendance on the king's majesty,' from St. Bartholomew's Hospital was complained of, and that Dr. Andrews was appointed as his substitute, 'but without prejudice to him in his yearly fee or in any other respect'—a procedure which shows the esteem in which Harvey was held. We learn from Aubrey that he accompanied Thomas Howard, Earl of Arundel, in his embassy to the emperor 1636; and during this journey he publicly demonstrated to Caspar Hofmann, the distinguished prof. of Nürnberg, and one of the chief opponents of his views, the anatomical particulars which made the circulation of the blood a necessary conclusion—a demonstration which, it is reported, was satisfactory to all present except Hofmann, who still continued to urge futile objections. (See CIRCULATION, in Anatomy, etc.) He attended the king in his various expeditions, and was present with him at the battle of Edgehill, 1642, Oct. 23. He accompanied the king after the battle to Oxford, where, according to the same authority, 'he came several times to our college (Trinity), to George Bathurst, B.D., who had a hen to hatch eggs in his chamber, which they opened daily to see the progress and way of generation; 'and where the honorary degree of doctor of physic was conferred on him in Dec. of that year. In 1645 he was, by the king's mandate, elected warden of Merton College; but on the surrender of Oxford to the parliament 1646, July, he left the university and returned to London. He was now 68 years of age, and seems to have withdrawn himself from practice, and from further

participation in the fortunes of his royal master. During the remainder of his life, he was usually the guest of one or other of his brothers, now men of wealth and high standing in the city; and it was at the country house of one of them that Dr. Ent visited him at Christmas 1650, and after 'many difficulties' (see Dr. Ent's Epistle Dedicatory, in Willis's translation of Harvey's works) obtained from him the MS. of his work on the generation of animals, published in the following year under the title *Exercitationes de Generatione Animalium*.

From this period to the time of his death, the chief object which occupied his mind was the welfare and improvement of the College of Physicians. In 1654 he was elected pres. of the college, but he declined the office on account of age and infirmities. In 1656, July, he resigned his Lumleian lectureship, which he had held more than 40 years; and in taking leave of the college, presented to it his little patrimonial estate at Burmarsh, in Kent. He did not long survive, but, worn down by repeated attacks of gout, died at London. Harvey's works in Latin were published 1766; a translation by Dr. Willis 1847 (new ed. 1881), See Willis's *Life of Harvey* (1878); and Huxley at the Ter-centenary celebration (*Nature*, 1878). A statue of Harvey was erected at Folkestone 1881.

HARVEY, WILLIAM HOPE, American author: b Buffalo, Putnam county, W. Va., 1851, Aug. 16. He was educated at Marshall College (W. Va.), and practiced law in 1871–84. He appeared as an author under the pseudonym 'COIN' in *Coin's Financial School* (1894), in advocacy of bimetallism as a currency standard. Other works by him are: *A Tale of Two Nations* (1894); *Coin's Financial School Up to Date* (1895); *Patriots of America* (1895); and *Coin on Money, Trusts, and Imperialism* (1899).

HARVEYIZED STEEL. See STEEL.

HARWOOD, ANDREW ALLEN, American naval officer: b. Settle, Pa., 1802; d. Marion, Mass., 1884, Aug. 28. He was a great-grandson of Benjamin Franklin (q.v.). In 1818 he entered the navy and served in the suppressing of the slave trade and piracy in the West Indies; in 1835–7 was with the Mediterranean squadron; in 1848 was given the command of the Cumberland, and in 1855 promoted to the rank of captain. In 1862 he was appointed chief of the bureau of ordnance and hydrography; in 1863 he was made commandant of the Washington navy yard and Potomac flotilla, having the rank of commodore, and retired in 1869 with the rank of rear-admiral. He published *Law and Practice of United States Navy Courts-Martial* (1867), and *Summary Courts-Martial*.

HARZ MOUNTAINS, *hârts:* broad mountain-range in n. Germany, extends e.s.e. from Goslar and Osterode in Hanover to Hettstädt and Mansfield in Prussian Saxony. It forms an elevated plateau, covered with irregular and, for the most part, forest-clad mountains, and situated mainly in Hanover and Brunswick. The range, divided

into Upper and Lower Harz, is 50 m. in length, about 16 m. in breadth, covering more than 750 sq. m. It is composed mostly of graywacke belonging to the Devonian formation, and broken through in one or two places by granite, as in the Brocken (q.v.) and the Rammiberg. The highest peak of the range is the Brocken. The Harz mountains are exceedingly rich in metals and minerals. Silver, iron, lead, copper, zinc, etc., are mined; marble, alabaster, and granite are quarried. Mining, stone-cutting, and the timber trade afford employment to the inhabitants. The Harz mountains are the scenes of many of the wild legendary tales of German literature.

HAS, v. *hăz* [contracted from *haves*]: 3d pers. sing. pres. of HAVE, which see.

HASDRUBAL, *hăs'drû-bal*, more correctly ASDRUBAL, *ăs'drû-bal* (*one helped by Baal*): name of frequent occurrence in Carthaginian history, there being nearly 20 more or less celebrated individuals so called.

HAS'DRUBAL (d. B.C. 221), son-in-law of Hamilcar (see HAMILCAR BARCA), who accompanied his father-in-law to Spain (B.C. 236), and for eight years after the death of Hamilcar, carried out Hamilcar's plans. The empire which the military talent and energy of Hamilcar had founded was consolidated by the skilful statesmanship of Hasdrubal. He formed the s. and e. coasts of Spain into Carthaginian provinces, and founded many towns, the most famous of which was Carthago Nova (now *Cartagena*), possessing a fine harbor, and having in its neighborhood rich mines. This city he adorned with a splendid 'royal palace.' Under his direction, agriculture flourished; mining was vigorously prosecuted; the tribes as far n. as the Ebro became subject to Carthage, and paid tribute; and powerful chiefs were attached to Carthaginian interests by intermarriage and other means. Hasdrubal was at length murdered by a slave, whose master he had put to death. He was a leader of the popular party at Carthage after the conclusion of the first Punic war, and was early brought into public life. He was a skilful general, and showed great energy and prudence in a war with the Numidian tribes. But his talents were particularly administrative. So powerful was he in Spain, and so independent of the home government, that the Romans made the famous treaty in regard to the Iberus as the common frontier not with the Carthaginians, but with Hasdrubal.

HASDRUBAL (d. B.C. 207), brother of the great Hannibal and son of Hamilcar Barca, was conspicuous in the second Punic war, first as the opponent of the Scipios and the conquerer of Cn. Scipio in Spain, afterward as commander of a Punic army in Italy. While he was marching southward to join Hannibal in Umbria, he encountered the Roman consuls, C. Nero and M. Livius, at the river Metaurus. The Romans gained a complete victory; an immense number of the Carthaginian forces were slain; and Hasdrubal, himself, when he saw that all was lost, rushed

into the midst of the enemy, and fell: see HANNIBAL. In generalship and in military bravery he seems to have been little inferior to his father and brother.

Others of the name were the following,—HASDRUBAL, one of Hannibal's principal officers in his Italian campaigns, who largely contributed, by a well-timed charge, to decide the victory on the great day of Cannæ.—HASDRUBAL, called Calvus, i.e., the Bald, led an expedition to Sardinia, B.C. 215, during the second Punic war. He was defeated by the Roman general, and carried to Rome as a captive.—HASDRUBAL, the son of Gisco, co-operated with Hasdrubal, son of Hamilcar, in Spain, and afterward, in conjunction with Syphax, unsuccessfully opposed Scipio in Africa, B.C. 204.—HASDRUBAL, the unfortunate general to whom fell the hopeless task of defending Carthage against the Romans in the third Punic war. He was at first commander outside the city (another Hasdrubal, grandson of the Numidian Masinissa, being general within the city); but he ultimately became sole leader, and opposed all the plans and movements of Scipio with great energy and skill. But at length Carthage fell, and Hasdrubal was carried prisoner to Rome, to adorn the triumph of his conquerer.

HASE, *hâ'zĕh*, KARL AUGUST: German theologian: b. Steinbach, Saxony, 1800, Aug. 25; d. 1890, Jan. 3. After leaving Altenburg gymnasium, he studied theology at Leipsic, Erlangen, and Tübingen. For taking part in the *Burschenschaften*, he was, after a tedious trial, confined five months in the fortress of Hohenasperg. In 1829, after having been *Privat-docent* for a year, he was made extraordinary prof. of philosophy in Leipsic, where his lectures on Dogmatics and the life of Christ were especially attractive. He was, indeed, the first critical biographer of Christ who decidedly rose above the old rationalistic conception of him as merely an excellent moral teacher, his *Leben Jesu* (1829, 5te Aufl. 1865), which appeared six years before Strauss's, having proposed as its aim to show, 'how Jesus of Nazareth, according to divine destination, by the free act of His own spirit, and by the opportunities of His time, became the Savior of the world.' Vindicating equally the rights of the individual religious consciousness, and the historical importance of the church, he opposed modern supernaturalism, as in *Die Leipziger Disputation* (1827), equally with extreme rationalism, as in *Theologische Streitschriften* (1834–37), and *Die Tübinger Schule* (1855). Before the first year of his professorship in Leipsic was over Hase was called as prof. of theology to Jena, where he remained, laboring principally in the departments of Dogmatics and church history. His *Hutterus Redivivus* (1827, 10th ed. 1862) seeks to do justice to the old Lutheran dogmatic theology in contrast with modern systems by exhibiting its harmonious completeness: it is in extensive use among the German theological students. Besides his *Compendium of Universal Church History* (1834, 9th ed. 1867), which has been trans-

lated into English, and is unsurpassed for its concise pictures of times, men, and systems, Hase treated special portions of church history in *Die beiden Erzbischöfe, Neue Propheten, Franz von Assisi* (1856), and *Das geistliche Schauspiel* (1858). He published also several works on ecclesiastical law; an ed. of the *Libri Symbolici Ecclesiæ Evangelicæ; Ideale und Irrthümer* (1872); etc.

HASELTINE, *hā'zĕl-tīn*, WILLIAM STANLEY, American artist: b. Philadelphia, 1835, Jan. 11; d. 1900. He was graduated from Harvard in 1854, studied art in Düsseldorf and Rome, and was a member of the National Academy from 1861. Among paintings by him may be named *Indian Rock, Nahant; Castle Rock, Nahant; Bay of Naples; Ruins of a Roman Theatre.*

HASH, v. *hăsh* [F. *hachis*, minced meat—from *hacher;* to hack or mince (see HACK 2)]: to chop into small pieces; to mince and mix: N. a kind of stew consisting of meat cut into small pieces. HASH'ING, imp. HASHED, pp. *hăsht.*

HASHISH, or HASCHISCH, or HASHASH, or HUSHEESH, n. *hăsh'ēsh:* oriental name of the plant (or rather of the tops and tender parts of the plant) scientifically known as *Cannabis indica*, and which we term *Indian Hemp.* For the medicinal value of the preparations of hashish see HEMP, INDIAN. It is the peculiar intoxication occasioned by the use of hashish as a narcotic that will be now specially noticed. Its use is extensive throughout the east.

Various preparations of the plant are employed to produce the desired effect. A favorite mode of extracting its active principle is by boiling the tops and flowers with water, to which butter or oil has been added, evaporating and thus forming an oleaginous solution or fatty extract. This fatty extract is frequently mixed with other substances reputed to possess aphrodisiac properties, and is taken in the form of electuary, confection, or pastil. The *majoon* used at Calcutta, the *mapouchari* at Cairo, and the *dawames* or *dawamesc* of the Arabs, are preparations of this kind.

Dr. Moreau, of Tours, who has written an elaborate work on this subject (*Du Hachisch et de l'Alienation Mentale*, 1845), based not only on general observation but on personal experience, describes the *fantasia* (the term applied in the Levant to the excitement produced by this agent) as mental rather than sensual. 'The hashish-eater is happy, not like the gourmand or the famished man when satisfying his appetite, or the voluptuary in the gratification of his desires, but like him who hears tidings which fill him with joy, like the miser counting his treasures, the gambler who is successful at play, or the ambitious man who is intoxicated with success' (p. 54.) But the use of this seductive drug is a fearful peril, and an ultimate ruin. One of its first appreciable effects is the gradual weakening of the power of controlling and directing the thoughts. Then comes the stage above described; and accompanying, and in part following it, there are observed errors of sense,

false convictions, and the predominance of one or more extravagant ideas. These ideas and convictions are generally not altogether imaginary, but are suggested by external impressions erroneously interpreted by the perceptive faculties. Finally, if the dose is sufficiently powerful, there is a complete withdrawal of the faculties of the mind from external things.

HASIDIM: a body of Jewish pietists which arose in Poland in the 18th c. and made rapid headway in Eastern Europe. Its apologists call it a deeply spiritual movement, which sprang into life at a period of economic and religious decline after the uprising under Chmielnicki (q.v.) in the Ukraine, and in protest against formal and strictly pedantic rabbinism in Poland. Its founder, born in an obscure Podolian village, was Israel B. Eliezer, termed for his fame as healer and miracle-worker, Baal Shem-Tob, the good worker of miracles. Idolized by the common people for his sincerity and simplicity, he strove to inculcate true religion as higher than Talmudic learning and consisting in a love of God joined to warm faith and belief in the efficacy of prayer. Scholars, too, were attracted to his teachings, which were in such marked contrast to scholasticism and Cabalistic reveries.

About 1740, Besht, as he was called from the initials of the name given him, settled in the Podolian town of Miedzyboz, where he transmitted his views orally and gathered a number of disciples. A mystic, he came to regard himself and his opinions as revelations—a view which was bound to lead to aberration and extravagance in due course. His essential doctrines are the omnipresence of God and divine communion with man. The former led to a kind of religious pantheism, the latter to mechanical aids to devotion, ecstasy being the aim in view. Learning is secondary to exaltation; through concentration in prayer, the gift of prophecy and the power to effect miracles can be secured. The Zaddik, as the true Hasid is called, can mediate between God and the ordinary person; he can obtain salvation for the believer, being a favorite with God.

The doctrines were spread by disciples, particularly by two, Baer of Meseritz, and Jacob J. Cohen of Polonnoye, the latter of whom founded Hasidic literature by his sermons and books. The development of the movement was favored by political conditions and the disruption of Poland (1772–1795). As the Polish Jews lost their autonomy, scattered among three foreign powers, they were more readily attracted to the mystics, and forgot their burdens in the contemplation of the mysterious and supernatural. The Zaddik, or the leader of the Hasidim made converts on all sides, especially in Podolia, Volhynia, and parts of Galicia, where special houses of prayer arose, shoutings, and other mechanical incitements to devotion were the order of the day. Many miracle-workers appeared for the credulous, and often services were held in secret, to escape the persecution of influential rabbis who saw mischief in their meetings and practices.

The movement soon assumed two main characteristics—in the Ukraine and Galicia, and in Lithuania. In the former, under the direction of disciples of Baer of Meseritz, and the grandson of Besht, the support of the Zaddik became the chief feature, leading to exploitation and extravagance. In Lithuania, it was more rational, with more of the tendencies of rabbinism, making the Zaddik teacher, rather than miracle-worker. A heated struggle arose between the rabbis and the Hasidim, arrests were made, leaders were put under the ban (q.v.) and bitter persecution followed. The name assumed by the rabbis, 'Mitnaggedim' (opponents) is still applied to non-adherents of Hasidism. Accusations were made to the Russian government to check the heresy, although after the imprisonment of its leader, his views were found to be harmless to Russia and he was released.

As to the present status of the Hasidim, who half a century ago comprised half of the Jews in Russia, as well as of Poland, Galicia, Rumania, and Hungary, and who in Russia were legalized as a separate body in 1804, it may be said that with the spread of modern education among the Jews of Russia, the Hasidim began to lose their prestige, the government itself aiding in checking the power of the Zaddik in the Pale of Settlement. Hasidism, however, is by no means extinct, for it represents a spiritual force which must be reckoned with. See Graetz, *History of the Jews*; Schecter, *Studies in Judaism*.

HASKELL, Edwin Bradbury, American publisher and editor: b. Livermore, Maine, 1837, Aug. 24: d. Boston, Mass., 1907, March 25. He entered the office of the Portland (Maine) *Advertiser* in 1854, was a reporter for the *Journal* (1857–60) and *Herald* of Boston, held an interest in the *Herald* in 1865, and edited that paper 1862–87. He also held an interest in the Minneapolis *Journal*, the St. Joseph (Mo.) *News*, and the Los Angeles *Express*.

HAS'KINS, Charles Homer, American historical scholar: b. Meadville, Pa., 1870, Dec. 21. He was graduated from the Johns Hopkins University in 1887, studied also at Paris and Berlin, was instructor in history at Johns Hopkins in 1889–90, and in the Univ. of Wisconsin was successively instructor in history (1890–1), assistant-professor (1891–2), and professor of European history (1892–1902). In 1899-1900 he was a lecturer in history at Harvard, and in 1902 was appointed professor of history there.

HASLET, n., or Hastlet, n. *hăs'lĕt*, or Harslet, n. *hârs'lĕt* [F. *hastille*, the pluck of an animal—from *haste*, a spit—from L. *hasta*, a spear: OF. *hastier*, the rack on which the spit turns]: the heart, lights, liver, etc., of a pig.

HASP, n. *hăsp* [AS. *hæps*, a lock, a latch: Ger. *haspe*, the hinge of a door: Icel. *hespa:* Sw. *haspa*, a clasp, a latch: Dut. *haspe*, a reel to wind yarn on]: a fastening; the clasp that passes over a staple to be fastened by a padlock;

in *Scot.*, a hank of yarn: V. to fasten with a hasp. **Hasp'ing**, imp. Hasped, pp. *hăspt.*

HAS'SALL, *hăs'săl*, Arthur, English historian: b. Bebington, Cheshire, England, 1853, Sep. 28. He was educated at Oxford, where he has been at various times since lecturer, tutor, and examiner. He is one of the recognized authorities upon European history, his published books including *Life of Bolinbroke* (1889); *Louis XIV* (1895); *Handbook of European History* (1897); *The Balance of Power* 1715–89 (1896); *Class-book of English History* (1901); *History of France* (1901); *The French People* (1901); *Mazarin* (1903); *History of France* in *Temple Primers* (1903); *The Tudor Dynasty* (1904); etc.

HAS'SAM, *hăs'săm*, Childe, American artist: b. Boston 1859. He studied art in Boston and Paris; he is a member of Ten American Painters, of New York, and of the Société National des Beaux Arts of Paris. He is one of the freshest in style and most original of the American impressionists, and has gained medals at Paris, Munich, Chicago, Philadelphia, Pittsburg, 1899, Paris, 1900, Buffalo, 1901, St. Louis, 1904, etc.

HASSAN, *hâs'sân:* district of India in Mysore, bounded s.w. by the Madras dist. of S. Kanara, and s. partly by the state of Coorg; lat. 12° 30′—13° 22′ n., long. 75° 32′—76° 58′ e.: 3,291 sq. m. It is divided into a hill and a plain country, is drained chiefly by the Hemavati and Yagachi rivers, contains valuable forests, numerous wild animals, and large deposits of kaolin, feldspar, and quartz, and has a rich alluvial loam in its valleys. The principal crops are rice, tobacco, sugar-cane, cocoa-nut, and areca-nut palms, plantain trees, and chilies; exports, food grains and coffee; imports, European piece-goods, hardware, and spices. The numerous government schools are well attended. Pop. about 669,961—Hindus, 650,877; Mohammedans, 14,460; Jains, 1,954; Christians, 2,670.

HASSAN-BEN-SABAH: the 'Old Man of the Mountain' of European story, founder of the sect of the Assassins (q.v.), likewise denominated Hassanis or Ismanilians.

HASSARD, *hăs'sĕrd*, John Rose Greene: 1836, Sep. 4—1888, Apr. 18; b. New York: journalist. He graduated at St. John's College, Fordham, N. Y., 1855; was asst. ed. of Appleton's *New American Cyclopœdia* 1857–63; became an editorial writer on the New York *Tribune*, 1866, succeeded the late George Ripley as literary editor, 1880, and was also musical critic of the paper till 1883. In 1878 he translated the telegraphic cipher dispatches that passed between the national democratic committee and its agents in the Southern States, when the presidential election returns of 1876 were disputed, and afterward sought unavailing relief from the mental strain in travel and camping life. Among his publications are *Life of Archbishop Hughes* (1866); *Life of Pope Pius IX.* (1877); *History of the United States* (1877); *The Ring of the Nibelung: a Description of its First Performance* (1877); and *A Pickwickian Pilgrimage* (1881).

HASSELQUIST, *hâs'sĕl-kwĭst*, Frederick, Swedish naturalist: b. Ostrogothia 1722; d. Smyrna, 1752, Feb. 9. In 1741 he went to the University of Upsala, where his talents and industry drew the attention of Linnæus. In 1747 he published a dissertation *De Viribus Plantarum.* Wishing to make researches on the spot into the natural history of Palestine he spent some time at Jerusalem, and afterward visited other parts of the country. Returning to Smyrna he brought with him a collection of plants, minerals, fishes, reptiles, insects, and other natural curiosities. The Swedish queen, Louisa Ulrica, purchased the whole of Hasselquist's acquisitions, which were deposited in the castle of Drottningholm. Linnæus, from the papers and specimens of natural history collected by his pupil, prepared for the press the *Iter Palæstinum, or Travels in Palestine, with Remarks on its Natural History* (1757), which has been translated into English and other European languages.

HASSLER, *hâss'lẽr*, Ferdinand Rudolph: 1770, Oct. 6—1843, Nov. 20; b. Aernen, Switzerland: scientist. He received a scientific education in his native country, removed to the United States, and was appointed prof. of mathematics in the U. S. Milit. Acad. 1807; was appointed director of the U. S. Coast Survey, and sent to Europe to procure instruments and apparatus, and became the first supt. of the survey, which he directed 1816–18 and 1832–43. He was chief of the bureau of weights and measures for many years. His publications include papers in the *Transactions* of the American Philosophical Soc., a series of mathematical text-books, a *System of the Universe,* 2 vols. (1828); and *Reports to the U. S. Senate* (1832), and *to the Secretary of the Treasury on Weights and Measures* (1842).

HASS'LER EXPEDI'TION: fitted out by the U. S. Coast Survey to pursue hydrographic investigations on the Pacific coast; so called from the name of the vessel built for the purpose and christened in honor of the first supt. of the survey. The vessel was commanded by Com. P. C. Johnson, U.S.N.; carried Prof. and Mrs. Louis Agassiz, L. F. Pourtales, chief of dredging operations, Dr. F. Steindachner, ichthyologist, Dr. Th. Hill, botanist and photographer, Dr. White, chemist and photographer, and J. H. Blake, draughtsman and collector; sailed from Boston, 1871, Dec. 4; and returned to San Francisco 1872, Aug. Much valuable scientific information and large collections in natural history were acquired, but the death of Prof. Agassiz (1873, Dec. 14) prevented the publication of his exceedingly minute observations.

HASSOCK, n. *hăs'sŏk* [W. *hesg-og,* sedgy—from *hesg,* sedges: Scot. *hassock,* anything bushy, a large round turf used as a seat: Sp. *haz,* a bundle of hay, grass, or brushwood]: a cushion or thick mat to kneel on in church; a padded footstool.

HASTATE, a. *hăs'tāt,* or Has'tated, a. *-tā-tĕd* [L. *hastātus,* spear-like—from *hasta,* a spear]: spear-shaped;

formed like the head of a halberd; in *bot.*, applied to a leaf with two portions of the base projecting at right angles to the blade.

HASTE, n. *hāst* [Lap. *hasetet;* Ger. *hetzen*, to set on dogs; *hasten*, to haste: O.H.G. *heist*, anger: Sw. *hasta*, to push forward; Icel. *hastr*, fierce]: hurry; celerity of motion; precipitation: V. to move with swiftness; to push forward; to urge on. HAST'ING, imp. HAST'ED, pp. HASTEN, v. *hā'sn*, to drive or urge forward; to accelerate; to push on; to be speedy or quick. HASTENING, imp. *hā'sn-ĭng*. HASTENED, pp. *hā'snd*. HASTENER, n. *hā'sn-ẽr*, one who. HASTY, a. *hā'stĭ*, quick; speedy; eager; precipitate; irritable; rash; in *OE.*, early ripe. HA'STILY, ad. *-lĭ*, with speed or quickness; rashly. HA'STINESS, n. *-nĕs*, speed; hurry; rash eagerness. HASTY PUDDING, oatmeal and water, or flour and water or milk, boiled quickly together.—SYN. of 'haste, n.': dispatch; speed; bustle; quickness; nimbleness; swiftness; expedition; precipitance; vehemence; rashness; urgency;—of 'hastiness': rashness temerity; precipitancy; precipitation; irritability.

HASTENER, n. *hās'ner*. See under HASTLER.

HASTINAPURA: ancient capital of the Kurus (see KURU), frequently mentioned in the Mahâbhârata. The Vishnu-Purâna relates that it was founded by Hastin, and was washed away by the Ganges—under the reign of Nichakra, who, in consequence of this event, had to remove the seat of his government to Kaus'âmbî—and at a later period it was undermined by Balarâma. It was on the Ganges, and is placed by Lassen, in his map (to the *Indische Alterthumskunde*) about 78° long. and 28° 50′ latitude.

HASTINGS, *hâs'tĭngz:* Mich., county-seat of Barry co., on the Thorn-apple river, and on the Chicago, Kalamazoo and Saginaw, and the Michigan Central railroads, 32 m. s.e. of Grand Rapids. The city is in a rich farming and stock-raising section, and is an important supply and distributing centre with varied manufacturing interests producing, flour, farming implements, pumps, hose-reels, carriages and wagons, car-seats, felt boots, cigars, furniture, etc. The principal buildings are the city hall, jail and courthouse and library. It owns and operates its water-works. Pop. (1910) 4,383.

HASTINGS, Minn.: city: county-seat of Dakota co., at junction of the Miss. and Vermilion rivers; on the Chicago, Milwaukee and St. Paul railroad, 20 m. e.s.e. of St. Paul. Valuable water-power is afforded by the Vermilion river, which has here a fall of 110 ft. in half a mile. Hastings has become a noted lumber and wheat market; has several flouring and saw-mills, breweries, and grain elevators; manufactures machinery, carriages, furniture, etc., and contains a public library, young ladies acad., central and several ward school houses, churches, etc. Pop. 4,300.

HASTINGS, Neb., city of Adams co., in the s. and central part of the state; 96 m. w. of Lincoln, the taste

cap.; on the main line of the Chicago, Burlington and Quincy railroad, and branch lines of the Missouri Pacific, Union Pacific, and Northwestern roads. Hastings is the centre of the S. Platte country, a rich agricultural and stock-growing region, and has a large wholesale and retail trade. It has foundries, brickyards, carriage and sash-and-blind shops, bottling establishment, cigar-shops, broom factories, and a large candy factory. The principal streets are paved and provided with sewers, and there are more than 20 m. of street railways. There is a good system of water-works, and light is furnished by gas and electricity. The leading denominations have churches; the public schools are excellent; and Hastings College, an endowed institution under Presb. management, gives a four years' course of study, is open to both sexes, and has about 200 students, with a full corps of instructors. Hastings also contains the State Asylum for the Chronic Insane. The government, under the charter of 1891, consists of a mayor, elected for two years, and a city council. The city owns and operates the electric light plant and water-works. Pop. (1910) 9,338.

HASTINGS: parliamentary and municipal borough, market-town, and famous watering-place of England, county of Sussex, picturesquely situated on the shore, and surrounded by high cliffs on all sides except the s., which is open to the sea. It is about 35 m. e. of Chichester, and 74 m. s.e. of London by rail. It consisted formerly only of two streets, intersected by a small stream called the Bourne; but is now a considerable town, with many new streets and terraces erected in the nineteenth century. Stretching w. along the sea-front of the town is the Marine Parade, a spacious terrace, which, joined and continued w. by the Grand Parade of St. Leonards-on-Sea, forms one of the finest sea-walks in the kingdom. Formerly an insignificant village, situated a mile w. of Hastings St. Leonards is now the Belgravia of Hastings, is united with it by lines of handsome houses, and included with it in the population returns. The chief point of interest in Hastings is the ruin of an ancient castle, on the summit of the West Cliff, and supposed to have been erected previous to the Norman invasion. Fishing is the chief occupation—about 160 boats are employed. Owing to the want of a harbor, the boats have to be pulled up on the beach by means of a rope and windlass, worked by horse-power. Hastings is a great resort of pulmonary invalids during the cold season of winter and spring; and in summer has facilities for bathing, though probably less desirable as a summer residence than many other towns on the s. coast.

Hastings was a considerable place in the time of the Anglo-Saxons, and in the beginning of the 10th c. was of sufficient importance to have a mint. Here William the Conqueror landed 1066, and in the immediate vicinity are traces of a camp, said to be that occupied by the Normans on the night previous to their march against the Saxons: see BATTLE. Under the Confessor, Hastings became one of

the Cinque Ports, after which it long continued in great repute for ship-building. Pop. of municipal borough (1901) 65,528.

HASTINGS, *hās'tĭngz*: according to the French chroniclers, a viking or sea-rover of the 9th c. It is uncertain whether he was born in Norway, Denmark, or France, probably in Denmark. The story of his devastation is appalling. From his youth till old age his whole delight appears to have been in pillage, rapine, and bloodshed. The shores and cities of France, Spain, Portugal, and Italy are said to have been repeatedly wasted and burned by him and his savage comrades. As the Scandinavian *sagas*, however, speak of several Hastings, the Danish historian Suhm considers that the French chroniclers—who wrote at a much later period—have gathered up the confused traditions of the southwest of Europe, relating to all pirates of this name, and applied them to a single personage, who has thus become in their hands rather a type of the ferocious Norse viking, than a historical individual.

HASTINGS, Francis Rawdon, Marquis of: 1754, Dec. 9—1826, Nov. 28; b. Ireland: soldier. He entered the British army 1771; served in America through the war for independence; was made Baron Rawdon; succeeded his father as Earl of Moira 1793; re-enforced the Duke of York in Holland 1794; and became master-gen. of ordnance 1806. In 1813–21 he was gov.gen. of India, and for his important milit. services there was created Marquis of Hastings 1816 He resigned that office, and from 1824 till his death was gov. of Malta.

HAS'TINGS, Thomas, mus. doc.: 1784, Oct. 15—1872, May 15: b. Washington, Conn.: musician and composer. Early in life he became a trainer of church choirs; and after writing and lecturing on church music 1817–32, removed to New York where he passed the remainder of his life in promoting the improvement of church music. He published nearly 50 separate vols. of hymns, melodies, introits, etc., and received his degree from the Univ. of the City of New York 1858.

HAS'TINGS, Thomas Samuel, d.d.: Presb. theologian; b. Utica, N. Y., 1827, Aug. 28; son of Thomas Hastings. He graduated at Hamilton College 1848, and Union Theol. Seminary 1851; was pastor of the Mendham (N. J.), Presb. Church 1852–56, and the West Presb. Church, New York, 1856–81; prof. of sacred rhetoric in Union Theol. Seminary 1881–88, and pres. of the seminary 1888, Feb. 1904. He received the degree d.d. from the Univ. of the City ofo New York 1865.

HAS'TINGS, Warren: governor-general of India: 1732, Dec. 6—1818, Aug. 22; b. Churchill, Oxfordshire, England; descended from an ancient Worcestershire family. He was early left an orphan; but when only seven years old, he resolved to recover the manor and estate, which had passed out of the possession of his family. He was sent to Westminster School, and gave promise of being

among the first scholars of his age, when, at 17, he was sent out to India as a writer in the E. India Company's service. Having gained a moderate fortune, he returned to England 1764. In 1769, he again visited India, on his appointment as member of the council at Madras, and 1772 was promoted to be pres. of the supreme council of Bengal. A year later, parliament enacted that the chief of the presidency of Bengal should be styled gov.gen of India and that Hastings should be the first gov.gen. The finances of his government were in a disordered state, yet the demands of the E. India Company for money were incessant. His first step was to wrest certain rich provinces from the Great Mogul, and to sell them to Sujah Dowlah, the Nabob of Oude. The Rohillas resented the transfer, and Hastings lent the Nabob his army for their subjugation. The execution of Nuncomar soon after, on a charge of forgery, can no longer be charged as a crime against Hastings; for the verdict was amply justified by the evidence laid before Sir Elijah Impey and three other judges. Hastings exacted vast sums from Cheyte Sing, Rajah of Benares, and finally confiscated all his possessions. He formed a treaty with Asaph-ul-Dowlah, son of Sujah Dowlah, under which the mother and grandmother of the nabob, known as the begums or princesses of Oude, were to be stripped of their domains and treasures for the benefit of the Company. These were the chief blemishes of his Indian administration; but against these are undoubtedly to be set great public services. He was constantly trammelled by orders from home, and frequently borne down by an able and factious majority in council; yet he preserved the British empire in India from a formidable combination of foreign and domestic enemies. He acted with vigor when the war with France broke out; he broke the power of Hyder Ali; he organized a system by which justice was dispensed, the revenue collected, and peace maintained. He encouraged Asiatic learning. When he left India in the spring of 1785, that great empire was tranquil. A treaty had been concluded with Tippoo Sahib, son and successor of Hyder, and the Carnatic had been evacuated by the armies of Mysore. On his arrival in England, he was received with distinction by George III. and the court. The directors acknowledged his services by a unanimous vote of thanks. The whig opposition were, however, loud and vehement against him, and succeeded in carrying in the lower house a motion for his impeachment at the bar of the house of lords. The trial began in Westminster Hall 1788, Feb. 13. the managers of the impeachment being Burke, Fox, Sheridan, Windham, and Charles (afterward Earl) Grey. Burke opened the proceedings in a speech which extended through four sittings; Fox and Grey urged the charge respecting Cheyte Sing; and Sheridan was intrusted with the conduct of the article relating to the princesses of Oude. The interest taken by the public in the impeachment began to decline after these great displays of rhetoric. The trial notwithstanding, languished for more than seven years.

On the 149th day (1795, Apr. 23), it terminated in the acquittal of Hastings. Out of 400 peers, only 29 voted. The last 24 years of his life were passed serenely at Daylesford, in literary pursuits, and the occupations of a country gentleman. He died at Daylesford. The story of his life and his memorable impeachment has been told by Lord Macaulay with much greater eloquence than impartiality. See also the *Biography* by Trotter (1878) and *The Story of Nuncomar* by Sir James F. Stephen (1885).

HAS′TINGS SAND: lower division of the Wealden beds, forming a portion of the Lower Cretaceous period. It consists of a considerable thickness (1,000 ft.) of sand, calciferous grit, clay, and shale; and differs little from the Weald Clay, the upper division of the series, except in being a little more arenaceous. The strata have been deposited in shallow fresh water. The sand often exhibits fine specimens of ripple-marks, and the clay which separates the sand-beds sometimes contains cracks produced by the drying of the bed on exposure. The strata are highly fossiliferous. There are numerous saurian reptiles, including the huge iguanodon and the flying pterodactyle. The remains of several chelonians also occur. The fish belong chiefly to the ganoid or placoid orders, the most remarkable being the lepidotus, whose conical palate teeth and thick, square enamelled scales are very frequent. The shells belong to genera which inhabit fresh water, such as Paludina, Cyclas, and Unio.

HASTLER, n. *hăs′lẽr* [OF. *hastier*, the rack on which the spit turns (see HASLET)]: corrupted into HASTENER, n. *hās′nẽr*, a screen to reflect the heat of the fire on roasting meat. *Note.*—The corruption into *hastener* supposes the word to come from *haste*, which it does not.

HASTLET, n. *hăs′lĕt:* see HASLET.

HAS′WELL, CHARLES HAYNES American engineer: b. New York, 1809, May 22; d. 1907, May 12. His practical education as marine and mechanical engineer was learned in a steam-engine factory. In 1836 he was appointed chief engineer in the United States navy. He built the first practical steam-launch in 1837 and was the first to use zinc to protect the hulls of iron vessels and boilers from the galvanic action of salt water and copper. After 1898 he was the consulting engineer of the board of public improvements in New York city. His published works include *The Mechanics'* and *Engineers' Pocket Book* (1901); *Mechanics Tables* (1854); *Reminiscences of an Octogenarian* (1895).

HAT, n. *hăt* [Icel. *hattr;* Fris. *hatte;* Dan. *hat*, a hat]: a covering for the head: *figuratively*, the dignity of a cardinal in the R. Cath. Chh. HAT′BAND, n. a band round a hat. HATTED, a. *hăt′tĕd*, wearing a hat. HAT′LESS, a. without a hat. HAT′TER, n. *-tẽr*, one who makes or sells hats.

HAT: species of head-covering, which has assumed various shapes and characters. What we understand by a

hat is a fabric of felt (q.v.), of straw, or a silk material used as a substitute for felt. Hats are only a variety of the still more ancient cap and bonnet, and were at first made of velvet, silk, and other rich materials. Formed of felt, and assuming a certain firmness of fabric, hats began to be manufactured in England about 1510, and we hear of them superseding caps, or softer headgear, in the reign of Elizabeth. The felting of caps is, however, said to have been long known anterior to this period; and there is a tradition that a knowledge of felted caps or hats had been introduced by the Crusaders. Wool was the material first employed for felt hats; but in time, as trade with America was developed, the fur of the beaver (q.v.), being finer and softer, came into use; hence, the term beaver was long synonymous with hat. For about three centuries, fine beaver hats, dyed black, and prepared with much skill, formed the head-covering of the higher classes in Great Britain; the middle and humbler classes continuing, for a long time, to use the less expensive caps and bonnets according to the fashions of their ancestors. See BONNET.

The growing scarcity of beaver-fur led to attempts to substitute a cloth of silk plush drawn over a pasteboard frame about 1810. These were not very successful; and hats of wool or beaver-felt were common until about 1840, The high cost of beaver at length forced on the improvement of silk-hats, and now the beaver is almost entirely superseded; while the fabrication of silk hats has been carried to great perfection in England and on the continent and in the United States.

As suggested by the whims of fashion hats have undergone a wide variety of changes of shape. The raising of the top part in which the head is inserted, and the widening or diminishing of the brims, have constituted the chief differences. Sometimes the top has been high and narrow, sometimes high and widened; and the brim has sometimes been so broad as to be looped up. Political and religious differences have been marked by the form of hat. The Puritan of the reign of Charles I. adopted the steeple hat, high and narrow with a broad brim, and devoid of ornament, as the badge of his party. The Cavalier, during the same era, wore a lower and broader crown, with a feather stuck on one side. And a still lower-crowned hat, with a profusion of feathers, became the fashion in the reign of Charles II. The Quaker hat, low in the crown with a broad brim, and quite plain, dates from the origin of the sect at the middle of the 17th c. A growing extravagance in breadth of brim, led to the device of looping up the back and sides, and so was fashioned the cocked-hat, worn by gentlemen throughout the 18th c. But in the cocked-hat era there were exceptions to the fashion. Beaux, by way of singularity, wore low-crowned hats with brims, and these must be considered the precursors of the present round-hat, which finally superseded every variety of cocked-hat at the beginning of the 19th c. While cocked-hats ceased to be used

by British common soldiers at the reform of military costume consequent on the war with the French Republic, officers in the army continued to a later period to wear that species of flattened cocked-hat known as the *chapeau bras*—that is the hat which, by being flattened up, could be carried conveniently under the arm. This kind of hat was disused by regimental officers about 1812; but with slight variation in shape, it is still continued by field-officers in European armies.

Light, handy, and, in effect, adding height to the stature, the common round-hat is easily damaged, and quite unsuitable for rough wear in travelling or in the country. Therefore, there have been introduced a variety of undress hats, black, brown, and gray, and some of them of felt almost as soft as cloth. With these exceptions, the round hat known as the 'silk hat,' with slight changes of form from time to time as suggested by fashion, continues to be proper for ceremonial dress. The low-crowned, rounded top, stiff hat of felt (known as the Derby, and by other names) is however in very extensive use, as a sort of convenient medium between the dress hat and the soft felt hat. The great centres of hat manufacture in the United States are Danbury, Bethel and Norwalk, Conn., Orange, N. J., Philadelphia and Reading, Pa., and Brooklyn, N. Y.

The furs most generally used in manufacturing felt hats are the beaver, which is found in the northwestern part of the United States and Canada; the coypou or nutria, known as the South American beaver; the Saxony and the Russian hare; the Scotch, English and French coney, and muskrats. The finest furs are taken from the nutria, beaver and otter, all water animals, that portion which is taken from the belly being regarded as the choicest. The others are land animals, the fur from the back being regarded as the best. In the more common grades of hats sheep's wool is used, while in the inferior grades wool is mixed with cotton and other vegetable fibres. These, however, cannot be properly termed felt hats, because the materials used are not felted together. They are cemented and are then stiffened by shellac.

Furs for the higher grade hats require the most exhaustive preparation. Upon their arrival at the factory the pelts are first washed with whale-oil soap to remove the superficial fatty matter which clings to the fur. A further purification is necessary, however, and for this purpose 'carrotting' is employed. A solution of mercury and nitric acid is applied to the pelts. This chemical, deposited in the cellular tissues, absorbs and thoroughly destroys all animal fats and gives to the fur its felting properties.

After a thorough brushing the fur is next cut from the pelts and is then stored away to mellow and season, for the reason that, like good wine, it strengthens and improves with age. When these furs have become properly seasoned, and are in prime condition, the hair is removed by a machine known as a 'blower.'

The next stage in the life of the hat is the forming. The exact quantity of properly mixed fur is carefully weighed and placed upon an endless apron at one end of a box-like machine. At the other end of the machine there is a large perforated cone of sheet copper, revolving rapidly over a funnel, under which there is a powerful suction fan at work. As the attendant carefully feeds the fur to the machine in the proper quantity it is carried by the apron toward the cone. The suction of air attracts this fur and causes it to adhere to the surface of the cone. This continues until the cone is covered with a sufficient quantity of fur to make a hat. The whole operation requires only two or three minutes. As soon as the cone has accumulated the necessary fur a wet cloth is thrown over it, and a second cone, larger in dimension, is placed over that. Both are immersed in a tank of hot water for a few moments. This is the first stage of the felting. It causes the perfect adhesion of the various fibres. The operator slips this conical body from the cone. It is now several times larger than its ultimate size. It has assumed the primary form.

Sizing, as the felting is termed, is the next process. The body, which has just been removed from the cone, is placed in a sizing kettle, where it is shrunk in hot water. Continuous rubbing and rolling reduces it in size almost one-quarter. It still retains its cone shape, but it is now firmly felted. The hat is now ready for dyeing. It is immersed in a great color vat and dyed to meet the prevailing fashion. After dyeing the next step is to stiffen slightly the brim of the soft hat by the application of water stiff, a solution of shellac. The body is now beginning to assume a definite form. It is stretched, blocked and pulled, and, with the aid of hot water, steam and ingenious machinery, it is given stability of shape and form. The rough surface must now be cut off. This operation requires great care. If too much of the fur be removed all the previous skilled manipulation becomes valueless and the hat is ruined. This operation is known as pouncing. It is done by a machine and emery paper. The crown is next given its shape, as demanded by the style. It is stretched over wooden blocks, ironed and re-ironed. It must then be carefully pounced by hand and steamed to tighten the felt. The brim must be treated exactly the same way, although it is not given shape at this time.

The hat is next flanged, or, rather, the brim is given its shape. The brim is placed upon a flange of metal or wood so as not to affect the crown. The entire hat resting on the flange is then placed under a huge receptacle containing heated sand and having on the under side a heavy cotton fabric, which comes in direct contact with the felt. After remaining in this position for several minutes the brim of the hat has its correct shape and trimming is in order. The turning up and edging each play an important part in the final process of shaping. In trimming artistic

treatment is a necessity. Care must be taken in attaching the bands and bindings to preserve the neatness as well as the character of the design. The insertion of the sweat leather must be carefully done. All these and other details add greatly to the appearance and durability of the finished product.

The stiffening of the derby, better known as the 'stiff hat,' because of the character of the felting, is an interesting process. The hat body is impregnated with a solution of shellac and alcohol of given density. This substance is carefully worked into the heart of the body, and as a result the felting attains a condition of firmness. The hat is then placed on a wooden block, is immersed in hot water, and is given the proper proportion and shape before the final pressing. At the conclusion of this operation the superfluous gum is cleared away by a soda bath. When dry the hat is rigid throughout. It is then placed in an oven and kept there until it becomes pliable. A mould, to which tremendous pressure is given by mechanical or hydraulic means, completes the pressing after the derby has been pounced or finished. The pouncing of a derby is done upon a lathe. It is placed on a wooden block similar to the moulds used in pressing. Should the operator cut off too much of the surface fur, thus destroying the nap, the stiffening will be exposed and the work of the skilled men who preceded him loses its value. Curling or shaping of the brim is done with a variety of small tools, heat, steam, deftness of fingers and a good eye. The trimming, binding, etc., of stiff hats require even greater care in their selection and adjustment than in the case of soft hats.

HATCH, v. *hăch* [Sw. *häck*, a coop: *häcka*, to hatch, to breed: Ger. *hecken*, to peck, to hatch young; *hecke*, a hedge or fence, a time of breeding—*lit.*, to produce birds under a hatch or coop]: to produce young from eggs, as by a hen or by artificial heat; to contrive or plot: N. a brood; in *OE.*, disclosure; discovery. HATCH'ING, imp. HATCHED, pp. *hăcht*. HATCH'ER, n. *-ẽr*, one who, or that which.

HATCH, v. *hăch* [F. *hacher*, to hack—from *hache*, a hatchet: Norw. *hak*, a score or incision]: to shade or delineate by lines in drawing and engraving; to engrave. HATCH'ING, n. shading with a blacklead pencil or pen, or in engraving. *Note.—Etching* may only be a corruption of *hatching*.

HATCH, v. *hăch*, and HATCHES, n. plu. *hăch'ĕz* [Dut. *hæck*, a hook; *heck*, a barrier, a grating: Low Ger. *haken*, to hook, to hold fast: Sw. *hack*, a hedge of branches: Fin. *hakki*, a hurdle made of wattles], a frame of cross-bars laid over an opening in the deck of a ship, or other opening; the opening itself—also called HATCHWAY, a half-door frequently grated. HATCH, v. to close, as with a hatch. HATCH'ING, imp. HATCHED, pp. *hăcht*. HATCH'ES, n. plu. openings for exploring mines; flood-gates to stop the course of water. UNDER HATCHES, *literally*, confinement as a criminal on board ship; *figuratively*, in a

state of depression, poverty, or ignominy.—*Hatches* in a ship are square or oblong openings in the deck, forming the communications between one deck and another. The fore-hatchway is usually close abaft the foremast, the after-hatch-way between the main and mizen-masts, and the main-hatchway immediately before the main-mast. This last is ordinarily the largest, and through it goods are hoisted to and from the hold. In merchant vessels, especially barges, there are frequently other hatchways, according to the nature of the cargo; indeed, in some craft, the whole deck consists of hatchways. When they are used for passage-ways, a companion-ladder is placed from each hatchway to the deck below. These ladders are, however, usually limited to the fore and after hatches. As an officer or sailor emerges through the after-hatch, in ascending to the upper deck, he touches his hat in token of 'salute to the quarter-deck.' When not used for a passage-way the hatchway is covered by a wooden grating which admits air and sufficient light to those below, while it protects men operating above from accidental falls. During stormy or wet weather, these gratings are covered with tarpaulins, securely fastened, and the deck becomes water-tight. After an action by boarding, the conquered crew are often battened down in the lower decks, and then made prisoners as they are allowed to ascend through the hatchway one by one.

HATCH, *hăch*, Edward: 1832, Dec. 22—1889, Apr. 11; b. Bangor, Me.; soldier. He entered the vol. army 1861, Apr., was commissioned capt. 2d Io. cav. 1861, Aug., and promoted maj. Sep. 5, and lieut.col. Dec. 11 following; col. 1862, June 13; brig.gen. 1864, Apr. 27; brevetted maj.gen. 1864, mustered out of the vol. service and appointed col. 9th U. S. cav. 1866, and brevetted maj.gen. U. S. A. 1867. He was a noted cavalryman and Indian fighter.

HATCH, John Porter: soldier: b. Oswego, N. Y., 1822, Jan. 9; d. 1901, April 12. He graduated at the U. S. Military Academy, 1845, served through the milit. occupation of Tex., and the Mexican and civil wars, and was promoted captain 1860; appointed brigadier-general of volunteers 1861, Sep. 28; promoted major and lieutenant-colonel U. S. A.; brevetted colonel and brigadier-general U. S. A., and major-general volunteers 1865, Mar. 13, promoted colonel 2d U. S. cavalry 1881, June 26, and retired 1886, Jan. 9. He was an intrepid cavalry raider, and was severely wounded several times during the civil war.

HATCH, Rufus: financier: 1832, June 24—1893, Feb. 23; b. Wells, Me. He was brought up on his father's farm received a village school education, went west in 1851, and was employed with the corps of civil engineers surveying for the first railroad built in Wis. In 1854 he settled in Chicago, became a grain broker, and failed with heavy liabilities at the close of the Crimean war. In 1862, after paying in full and with interest his Chicago debts, he removed to New York, joined Henry Keep in heavy railroad

operations, was elected managing director of the Pacific Mail Steamship Company, gave a memorable entertainment on board the steamer *City of Pekin* at Newport,and with the company was again financially ruined 1873. He then engaged in promoting the cattle industry in the west, recovered his losses, again paid his creditors in full and with interest, and resumed business in New York. He built the large hotel in the Yellowstone National Park, organized the company that built a fleet of iron pleasure steamboats in New York, and he contributed largely to church enterprises. He had the largest library of church music in the country. He was an accomplished organist.

HATCH, William Henry, American lawyer: b. Georgetown, Ky., 1833; d. 1896. He was admitted to the bar in 1854; served through the civil war in the confederate army, and was a member from Missouri in the United States house of representatives from 1879 to 1895. The Hatch Act which distributed Federal aid to agricultural experiment stations in all the states and territories was inspired by him.

HATCHEL, n. *hăch'ĕl*, or Hackle, n. *hăk'l* [Ger. *hechel;* Dan. *hekel*, a heckle, a comb: a board set with iron teeth used for separating the finer parts of hemp and flax from the coarser; a large sort of comb]: V. to separate the finer from the coarser parts of flax or hemp by means of a hatchel; to tease or vex by sarcasms or reproaches. Hatch'elling, or Hatch'eling, imp. Hatch'elled, or Hatch'eled, pp. *-ĕld*. Hatch'eller, or Hatch'eler, n. *-ĕl-lĕr*, one who.

HATCHET, n. *hăch'ĕt* [F. *hachette*, a small ax—from *hacher*, to hack]: a small sharp ax with a short handle. To take up the hatchet, to make war. To bury the hatchet, to make peace. Hatchet-faced, having thin, prominent features.

HATCHETINE, n. *hăch'ĕt-ĭn* [after Mr. *Hatchett*]: mineral tallow, a waxy or spermaceti-like substance greenish-yellow.

HATCHIE River, *hăch'ē:* rising in the n e. part of Mississippi, and emptying into the Mississippi river, near Randolph, about 25 m. above Memphis, Tenn. It runs through a fertile cotton region, and is navigable by small steamboats about 100 m. from its mouth.

HATCHMENT, n. *hăch'mĕnt* [corrupted from *achievement*], (sometimes also Ach'ievement): funeral escutcheon placed in front of the house of the deceased, or elsewhere, setting forth his rank and circumstance. It is in the form of a lozenge, and in its centre are depicted the arms of the deceased, single or quartered. Its use is not prevalent except in countries where title and rank are recognized, and heraldry is scientifically studied.

HATE, v. *hāt* [Swiss, *hatz*, anger: AS. *hettan*, to persecute: Icel. *hata;* Ger. *hassen*, to hate: Goth. *hatis*, anger: connected with Haste]: to dislike greatly; to detest; N. hatred. Ha'ting, imp. Ha'ted, pp. Ha'ter, n. one

who. HAT'ABLE, a. *-ă-bl*, that may be hated. HATE'FUL, a. *-ful*, exciting hate; odious; detestable. HATE'FULLY, ad. *-lĭ*. HATE'FULNESS, n. HATRED, n. *hā'trĕd*, intense dislike or aversion; ill-will; enmity.—SYN. of 'hate, v.': to dislike; abhor; abominate; loathe;—of 'hateful': execrable; loathsome; malevolent; malignant; repugnant; abhorrent; abominable;—'hatred': aversion; antipathy; repugnance; rancor; malevolence; malice; odium; animosity; malignity; detestation; loathing; abhorrence.

HAT'FIELD, *hăt'fēld*, JAMES TAFT, American German scholar: b. Brooklyn, N. Y., 1862, June 15. He was graduated from the Northwestern University in 1883, from the Johns Hopkins University in 1890; was appointed professor of German language and literature at Northwestern in 1890, and became contributing editor of *Americana Germanica*. During the Spanish-American war he served from seaman to chief yeoman on board the cruiser Yale. His publications include *Materials for German Composition* (1896); editions of Freytag's *Rittmeister von Alt-Rosen* and Goethe's *Hermann und Dorothea*, *German Lyrics and Ballads* (1900); *The Diary and Correspondence of Wilhelm Müller* (with P. S. Allen, 1903); *From Brown to Heather* (1903); Goethe's *Egmont* (1904) etc.; and various articles and monographs on subjects of German literature.

HATH'AMITE, *hăth'a-mīt*, an explosive invented in 1902 by G. M. Hathaway, of Wellsboro, Pa., and remarkable not only for the enormous energy liberated by its explosion, but also for the safety with which the substance may be handled. Hathamite may be pulverized on an anvil with a sledge hammer without exploding, and rifle balls may be fired through it without effect. Lighted matches may also be thrown into it with impunity, and when poured upon a fire it burns quietly, with the evolution of immense quantities of smoke. Apparently, explosion can be induced only through the agency of a dynamite percussion cap. Hathamite is a coarse powder, of a bluish-gray color, whose co position has not yet been divulged. It explodes with exceeding violence when fired with a suitable percussion cap. In one test a charge of an ounce and a half blew a two-inch hole through a piece of quarter-inch boiler plate, when merely laid upon the plate, and detonated in the open air. In another test a little over eight ounces of the explosive was actually melted and poured into a six-pound shell; and when the charge was afterward detonated, the shell was thoroughly fragmented. One marked advantage of hathamite is, that it will explode even when frozen.

HATHRAS, or HATRAS, *hâ-trâs'*: town of Hindustan in the N. W. Provinces, 33 m. n. of Agra, lat, 27° 36′ n., and long. 78° 9′ e. Hathras has a considerable trade, particularly in the cotton of the neighborhood. As a place of some strength, it was prominent in the wars of the Doab; but, 1817, falling into the possession of the British, it was immediately dismantled. Pop. about 30,000.

HAT MON'EY: small duty or primage paid to the master of a ship for his care and trouble over and above the freight. The right to it is regulated entirely by custom of particular ports. The name is probably derived from the payment being originally gratuitous, and given to the master on going round with the hat at the end of a prosperous voyage.

HATTEMISTS, n *hăt'ĕm-ĭsts* [named from their founder, Pontain *Van Hattem*, a Dutch divine]: in *chh. hist.*, a sect which sprang up in Holland in the 17th c. Hattem is said to have denied that the death of Christ was an expiatory sacrifice, and affirmed that in his teaching he simply signified to us that there was nothing in us which could offend God, and in this way he made us just; also that God punished men by their sins, not for their sins. The sect afterward discarded the first name of Hattemists.

HATTER, v. *hăt'tẽr* [Scot.]: in *OE.* and *prov. Eng.*, to entangle; to weary out; to wear out; to harass: N. in *Scot.*, an irregular collection or assemblage of any kind, as 'a hatter of stanes,' a heap of stones.

HAT'TERAS, Cape. See Cape Hatteras.

HATTIESBERG, *hăt'tēz-bẽrg*, Miss., city, county-seat of Perry County; on the Leaf river, and on the Gulf & S. I., the New Orleans & N., the Mobile, J. & K. C., and the Pearl & L. R. R.R.'s; about 65 m. n. of Biloxi and 84 m. s.e. of Jackson. The Gulf & Ship Island railroad is the shortest route to the Gulf of Mexico. Hattiesburg is the trade centre of a large fertile agricultural region in which an excellent quality of cotton is extensively cultivated. The industries are growing rapidly and its good railroad facilities mean good markets. The chief industrial establishments are saw-mills, planing-mills, cotton-seed-oil-mills, a cotton compress, a foundry, machine-shops, boiler works, brick-yards, a naval store factory, railroad shops, an ice plant, and the electric light and power plant. It has three banks, a number of fine public buildings. Pop. (1907) 7,500.

HATTI-SHERIFF, n. *hăt'tĭ-shĕr'ĭf* [Turk.—from Ar. *hatkt*, a writing, and *sherif*, noble], (sometimes called Hatti Humayun): name given by the Turks to every rescript of the sultan. The hatti-sheriffs are composed in the Turkish language, and written in the Arabian court-hand Diváni. Above the text, as a token of the authenticity of the rescript, stands the intricate flourish or mark of the sultan, usually in black, but sometimes in red or gold. This flourish is called Tugra or Rishâni Sherif—i.e., exalted sign; and the functionary who superscribes it is called Rischândschi, or the signer. The hatti-sheriff is irrevocable. That of Gulhana, promulgated by Abdul Medjid, 1839, Nov. 3 (renewed 1856, Feb. 18), which guarantees life and property to all subjects of the empire without distinction of creeds, has in modern times obtained the widest celebrity.

HAT'TO I.: abt. 850–913; of a Swabian family: 10th archbishop of the see of Mainz. He was abp. from 891 till

his death. When Emperor Arnulf died, Hatto became regent.

HAT'TO II.: archbishop of Mainz: d. 969 or 70. He was a monk of the monastery of Fulda, and succeeded the celebrated Rabanus Maurus, as abbot of the monastery of St. Boniface, about 942. In the second expedition of the emperor Otho I. into Italy, 961, Hatto was sent as his ambassador from Pavia to Rome; and after his return, he was raised to the see of Mainz, and continued one of the chief directors of the imperial counsels. Of his after-life, and of his personal character, opposite accounts have been given. By some he is represented as a zealous reformer, and an upright and successful administrator; by others, as a selfish and hardhearted oppressor; and the strange legend of his being devoured by rats, which Southey has perpetuated in his well-known ballad of *Bishop Hatto*, is represented as an evidence of the popular estimate of him. It is probable, however, that this legend is of much later date, and that its real origin is to be traced to the equivocal designation of the tower on the Rhine, Maüsethurm, near Bingen, selected as the seat of the occurrence. *Maüsethurm*, Mouse-tower, is probably only a corrupted form of *Mauththurm*, Toll-tower, a sufficiently descriptive name; but the modified form of the word might readily suggest a legend of mice or rats. The date at which the Maüsethurm was built is unknown. It was stormed by the Swedes 1635, nearly seven centuries later than Hatto's time.

HAT'TON, Sir Christopher, English statesman: b. at Holdenby about 1540; d. 1591. Lord chancellor of England, a favorite of Queen Elizabeth; was entered a gentleman commoner at Saint Mary Hall, Oxford, but removed without taking a degree, to the Inner Temple in 1560. He was introduced at court some time previous to the middle of the year 1564, and it is said Queen Elizabeth was so much struck with his graceful person and dancing that an introduction to her favor was the result, and gained him the name of 'the dancing chancellor.' He was a furious enemy of the Jesuits, and did not hesitate to accuse Parry, their defender in Parliament, and secure his execution. He was elected a member of Parliament in 1571, became captain of the Queen's Guard in 1572, vice-chamberlain and a privy-councillor in 1577, lord-chancellor in 1587. He was one of the commissioners for the trial of Mary Queen of Scots, in 1586. His artful speech to the unhappy queen, "If you are innocent you have nothing to fear; but by seeking to avoid a trial you stain your reputation by an everlasting blot," is supposed to have been mainly influential in inducing her to submit to trial. Spenser, whose patron he was, dedicated to him *The Faerie Queen*.

HATTON, Frank, American journalist: b. Cambridge Ohio, 1846, Apr. 28; d. Washington, D. C., 1894, Apr. 30' He served through the civil war in the army of the Cumberland, being commissioned and was subsequently

partner with Robert J. Burdette (q.v.) in the proprietorship of the Burlington *Hawkeye*. He was assistant postmaster-general (1881–4); postmaster-general (1884–5); editor of the Chicago *Mail* (1884–8); and editor of the Washington *Post* (1888–94).

HATTON, John Liptrot, English composer: b. Liverpool 1809; d. Margate, Kent, 1886, Sep. 20. Removing to London in 1832 he became famous for his many operas, cantatas, overtures, entr'actes, etc., and was musical director of the Princess Theatre 1853–9. He is now, however, remembered chiefly for his admirable settings of English songs, such as *Good-bye*, *Sweetheart*, *The Tar's Song*, *The Bait*, etc.

HATTON, Joseph, English journalist, novelist, and playwright: b. Andover 1841, Feb. 3; d. 1907, July 31. Beginning journalism on the Derbyshire *Times*, founded by his father, he went to London, where he edited the *Gentleman's Magazine* (1868–74); and became a newspaper correspondent for the New York *Times* and other journals. Among his numerous novels are: *Clytie* (1874); *Queen of Bohemia* (1877); *John Needham's Double* (1885); dramatized for E. S. Willard; *By Order of the Czar*, a novel of Russian life; *Princess Mazaroff*; *Under the Great Seal*; *When Greek Meets Greek*, a novel of the French Revolution successfully dramatized; *When Rogues Fall Out* (1899). Among his miscellaneous publications the best-known are: *Journalistic London*; *The New Ceylon; Henry Irving's Impressions of America; Old Lamps and New;* while among his plays may be cited a version of *The Scarlet Letter* successfully acted in the United States; *The Prince and the Pauper; Liz;* and *A Daughter of France*.

HAUBERK, n. *hăw'berk* [OF. *haubėrc;* AS. *healsbeorg*, a coat of mail—from *heals*, the neck; *beorgan*, to cover or defend]: coat of ringed or twisted mail for the neck and chest; sometimes extending only as high as the neck, but generally continued to form a coil, leaving only the face of the knight who bore it exposed. It often descended as a tunic below the knees. In early times, the sleeve of the hauberk sometimes terminated at the elbow, but in the 13th and 14th c. it came down to the wrist, and usually descended over the hand in the form of a glove, either one fingered or divided. In the 14th c. the hauberk was worn under plate armor. See Habergeon.

HAU'BERT: old term in feudal law, to denote the tenure of ward and relief.

HAUCH, *howch*, Hans Carsten: 1790, May 12—1872, b. Frederikshald, Norway: one of the best Danish poets of the 19th c. He graduated at the Univ. of Christiania 1821; and after having travelled through Germany, Italy, and France, settled at Copenhagen 1827, and was appointed prof. of physics at the Royal Acad. of Soroe, in Denmark. This post Hauch exchanged 1846 for the chair of northern literature in the Univ. of Kiel, but on the breaking out of the Schleswig-Holstein revolution, two years after-

ward, he was compelled to return to Copenhagen, where the dowager queen, Maria Sophia, offered him an asylum at the palace of Frederiksborg, where he resided several years; and on the death of his friend Oehlenschläger, 1850, he succeeded him in the chair of æsthetics at the Univ. of Copenhagen. Hauch's tragedies, *Tiberius og Bajazet*, *Gregory VII.*, and *Don Juan* (1829) at once established his reputation, which he fully maintained by his subsequent dramas, *Karl den Femten's Död* (Death of Charles V.), *Mastrichts Belejring* (Siege of Maestricht), *Svend Grathe* (1841), and *Marsk Stig* (1850). Many of his pieces were translated by himself into German, and were represented with success at the principal theatres of Germany and Sweden. Hauch's dramatic epic, *Hamadryaden*, which belongs to the ultra romantic school, had less favor among his own countrymen than in Germany; but his *Lyriske Digte*, 1842 (Lyrical Poems), some of which are extremely beautiful, have undisputed popularity in Denmark. As a writer of tales and romances, Hauch showed considerable diversity of talent; the principal are—*En Polsk Familie* (A Polish Family), *Slottet ved Rhinen* (The Castle on the Rhine), and *Guldmagern* (The Goldsmith, 1836–45(, *Saga om Thorwald Vidfœsle* (1849); *Nordische Mythologie*, *Waldemar Seier* (1862), etc. His *Robert Fulton* (1853) is regarded as the most perfect of his works. Hauch died at Rome.

HAUGH, n. *haw* [Gael. *auch*, a meadow: AS. *haga*, a hedge: Ger. *hag*, a fence]: in *Scot.*, a small low-lying meadow.

HAUGHT, a. *hawt:* OE. for Haughty, which see.

HAUGHTY, a. *haw'tĭ* [F. *hautain*, haughty—from *haut;* OF. *hault*, high—from L. *altus*, high]: proud and disdainful; arrogant. Haugh'tily, ad. *-lĭ*. Haugh'tiness, n. *-nĕs*, pride mingled with some degree of contempt for others; arrogance.—Syn. of 'haughtiness': superciliousness; disdain; contemptuousness; loftiness; highmindedness; —of 'haughty': proud; insolent; contemptuous; bold; adventurous; high; lofty.

HAUGIANS, *how'gĭ-anz* (Ger. Haugianer or Leser): members of a sect founded by Hans Nielsen Hauge (1771), Apr. 3—1824, Mar. 29; b. Thuno, Norway) within the Lutheran Church in Denmark and Norway; now almost wholly confined to Norway. Hauge was born and brought up on a farm, received a very limited education, became a zealous student of the Bible, and engaged in missionary labor in Norway 1796, and Denmark 1800. He was a powerful preacher; but, opposing ordination, creed, and other doctrines of the church, brought himself into conflict with the regular clergy. He opened a printing establishment in Christiansand, but his books were seized and confiscated. In 1804 he was arrested for holding illegal meetings and insulting the clergy, and after being imprisoned 10 years was released on paying a fine. Though differing with the Lutheran Church in some points of doctrinal belief, neither he nor his followers wholly separated from it.

HAUL, v. *hawl* [F. *haler*, to haul: Ger. *holen*, to fetch; Dut. *haelen*, to send for, to fetch]: to pull or draw with force; to drag; to transport by drawing; in *nav.*, to pull upon a rope directly; to change the direction of a ship's course: N. a catch, as of fish; a pull; among *ropemakers*, a bundle of about 400 threads to be tarred. HAUL'ING, imp. HAULED, pp. *hawld*. HAUL'ER, n. one who. HAULAGE, n. *hawl'āj*, the act of pulling or dragging, as a railway engine the carriages, the dues paid for pulling or dragging, as to a steam-tug. TO HAUL OVER THE COALS, to charge with a fault or misdemeanor, not exactly criminal, with a view to reparation—referring probably to the anc. ordeal of fire. TO HAUL THE WIND, to turn the head of the ship closer to the direction of the wind.—SYN. of 'haul, v.': to pull; draw; tug; pluck.

HAULM, n. *hawm*. See HALM.

HAUNCH, n. *hânsh* [F. *hanche;* OF. *hanke*, the hip—from O.H.G. *ancha*, or *encha*, the leg, the haunch: O.H.G. *hlancha*, the flank]: the hip; the part of a man or quadruped which lies between the last ribs and the thigh; a joint of mutton or venison; the hind part; in an arch, the part between the vertex and springing.

HAUNT, n. *hânt* [Bret. *hent*, a way: Bret. *henti;* F. *hanter*, to frequent, to haunt]: a place of frequent resort: V. to resort much or often to; to trouble with frequent visits; to visit, as a spirit or ghost; to be much about. HAUNT'ING, imp. HAUNT'ED, pp.: ADJ. frequently visited, especially by ghosts or apparitions; subject to the visits of HAUNT'ER, n. one who.

HAUPT, *howpt*, HERMAN, American engineer b. Philadelphia, Pa., 1817, Mar. 26; d. 1905, Dec. 14. He was graduated at West Point in 1855, but became a civil engineer, and joined the staff engaged on the public works of Pennsylvania. For three years he was prof. of civil engineering and mathematics in Pennsylvania College but in 1847 became consulting engineer of the Philadelphia railroad. He was afterward chief engineer of the Hoosac Tunnel and during the civil war chief of the United States bureau of military railroads. The Royal Polytechnic Society of Great Britain gave him their highest prize for the drilling machine which he invented, and he first made practicable the transportation and distribution of oil from the well side. He wrote *Hints on Bridge Building* (1840); *General Theory of Bridge Construction* (1852); *A Consideration of the Plans Proposed for the Improvement of the Ohio River* (1855); *Military Bridges* (1864).

HAUPT, LEWIS MUHLENBERG, American engineer: b. Gettysburg, Pa., 1841, Mar. 21. He was educated at Harvard and West Point. From 1872 to 1892 he was professor of civil engineering in the University of Pennsylvania, and for the year ending 1886 edited the *Engineering Register*. From 1897 to 1899 he was a member of the Nicaraguan and the Isthmian canal commissions. His published works include: *Working Drawings and How to*

Make and Use Them (1881); *Canals and Their Economic Relation to Transportation* (1890); *The Topographer—His Methods and Instruments; Physical Phenomena of Harbor Entrances; A Move for Better Roads;* etc.

HAUPT, Moritz, or Moriz: 1808, July 27—1874, Feb. 5; b. Zittau, Lusatia, Germany: philologist. He graduated at the Univ. of Leipsic 1830, became a private tutor and lecturer 1837, prof. extraordinary of German language and literature in the Univ. of Leipsic 1841, and prof. ordinary 1843, and was deprived of his office for taking part in the political agitation of 1849. In 1853 he succeeded Dr. Lachman as prof. of classical literature in the Univ. of Berlin, and 1861 was chosen sec. of the Berlin Acad. of Sciences.

HAUPT, Paul: an American educator and Assyriologist: b. Görlitz, Germany, 1858, Nov. 25; was graduated at the Gymnasium Augustum, Gôrlitz, 1876; afterward studied at the universities of Berlin and Leipzig and the British Museum; was tutor at the University of Göttingen, 1880–83; and became professor of Semitic languages and director of the Oriental Seminary, Johns Hopkins University, 1883. He is the author of *Akkadian and Sumerian Cuneiform Texts in British Museum* (1812); *The Babylonian Nimrod Epic* (1891); *The Cuneiform Account of the Deluge* (1880); *The Akkadian Language* (1883); *The Book of Canticles* (1902); *Koheleth* (1905); *The Book of Ecclesiastes* (1905); etc. He projected and continued to edit the so-called Polychrome Bible.

HAUPTMANN, *howpt'mân*, Gehart, German dramatist: b. Salzbrunn, Silesia, 1862, Nov. 15. After study at the Breslau Art School, he attended the universities of Jena and Berlin, traveled in Italy and Switzerland, and first appeared in literature with his epic, *Promethidenlos* (1885). This he followed by a swift succession of dramas—*Vor Sonnenaufgang* (1889), frankly socialistic and provocative of violent discussion; *Das Friedensfest* (1890); *Einsame Menschen* (1891); and *Die Weber* (1892), a story of an unsuccessful uprising of the Silesian weavers, typifying the hopeless condition of the proletariat. In these works Hauptmann reveals the influence of Tolstoi and Ibsen, and a strong revolt against the conditions imposed, particularly upon the working-class, by a military and plutocratic regimé. To this motif he returns in *Fuhrmann Henschel* (1898). But he strikes a different note in *Hanneles Himmelfahrt* (1893), a mystic *dream poem* as the author styles it, and *Die versunkene Glocke* (1897; Eng. trans. by Meltzer 1900), which harks back to an indefinite period of the middle ages and makes artistic use of the primitive Germanic fairy-lore. In *Kollege Crampton* (1892), *Der Biberpelz* (1893) with its inferior sequel *Der rote Hahn* (1901), and *Schluck und Jan* (1900) he displays gifts of humor and satire. Other works are *Florian Geyer* (1895) and *Michael Kramer* (1900). Hauptmann is the chief figure in modern German drama. He excels less in dramatic structure than in art of characterization, and despite

crudity and occasional dulness attains genuine poetic value.

HAUPTMANN, *howpt'mân*, Moritz: 1792, Oct. 13—1868, Jan. 3; b. Dresden, Germany: composer. He studied mathematics and architecture with his father, music with Scholz, Lanska, Grosse, and Morlacchi, and completed his education as a violinist and composer with Spohr. In 1812 he became a violinist in the royal orchestra of Dresden, 1822 entered the Cassel orchestra under Spohr's leadership remained there till 1842, and in that year was appointed cantor at the Thomas School, Leipsic, prof. of counterpoint and fugue at the newly-established conservatory, and musical director in the churches of St. Thomas and St. Nicholas. He composed a tragic opera, two masses, and numerous choral and part songs, and was widely esteemed as a teacher.

HAUPUR. See Hapur.

HAURAN, *hâ-ô-rân'* or *how-răn':* district in Syria, e. of Jordan and s. of Damascus; in the Greek and Roman period one of the 4 provinces of Bashan (q.v.); according to Arabic geographers the greater part of the ancient Bashan. Its present dimensions and population are unknown. Travellers report a fertile, volcanic country, remains of hundreds of ruined towns, an abundance of Greek inscriptions and a large Druse population. Hauran was the appointed n. e. boundary of the Holy Land after the captivity in Babylon. (See only mention in the Old Test., Ezek. xlvii, 16, 18.)

HAURIANT, *haw'rĭ-ant:* in heraldry, applied to a fish placed upright as if to refresh itself by sucking air.

HAURL, or Harle, v. *hârl* [Scot.]: to rough-cast a wall with a mixture of lime and gravel. Haur'ling, imp. Haurled, pp. *hârld.*

HAUS'MANNITE, *haws'măn-īt,* a native manganate of manganese, having the formula $MnO.Mn_2O_3$., and crystallizing in the tetragonal system, with octahedral habit. It is brownish black in color, and opaque with a submetallic lustre. It has a hardness of from 5 to 5.5, and a specific gravity of from 4.72 to 4.86. Hausmannite dissolves in hydrochloric acid, with evolution of chlorine gas. It occurs in Germany, Sweden, and elsewhere, usually in connection with porphyry. It was named in honor of the German metallurgist, J. F. L. Hausmann.

HAUSSE, n. *haws* [F.]: a kind of breech-sight for a cannon.

HAUSSE, a. *hōs'sā* [F.]: in *her.*, term applied to any ordinary when removed from its proper position and placed higher in the field.

HAUSSMANN, *ōs-mŏng',* Georges Eugene, Baron: French senator and administrator: b. Paris, 1809, Mar. 27. d. there 1891, Jan. 11. He was educated at the conservatory of music, became a lawyer, and after holding several prefectures under the presidency of Louis Napoleon was

appointed prefect of the Seine after the establishment of the empire. In this office he projected and executed a system of public improvements which transformed Paris into a new city, and included the improvement of the Bois de Bologne, the lengthening of the Rue de Rivoli, the construction of the Boulevard de Sebastopol and of more than 20 boulevards in the old parts of the city, various public gardens, squares, barracks, the Halles Centrales, new prefecture of police, more than 12 bridges,numerous hospitals and asylums (notedly the Hotel Dieu), and other public works. In 1869 he was charged with having raised more money than had been authorized, but on an examination of his accounts an additional loan of $52,000,000 was sanctioned. He was created senator 1857, elected member of the Acad. of Fine Arts 1867, removed from office 1870, appointed director of the Credit Mobilier 1871, and was several times elected a member of the chamber of deputies.

HAUSTELLATA, n. *haws-tĕl-lā'ta* [L. *haustus*, a drawing, used chiefly of water or other liquid]: in *entom.*, an extensive sub-class of insects consisting of those which take nothing but fluid aliment, having the organs of the mouth adapted solely for suction, in contrast to the *Mandibulata*, which have mandibles, or upper jaws; in *zool.*, a sub-class of crustaceans more commonly called *Epizoa* (q.v.).

HAUSTELLATE, a. *haws'tĕl-āt* [mid. L. *haustel'lum*, a sucker—from *haurĭō*, I draw water]: provided with a sucker. HAUSTO'RIUM, n. *-tō'rĭ-ŭm* [mid. L. *haustōrĭum*, a drinking-place, a well]: the sucker at the extremity of the parasitic root of dodder.

HAUTBOY, or HAUTBOIS, or OBOE, n. *hō'bŏy* or *ō'bŏy* [F. *hautbois*—from *haut*, high, *bois*, wood—from L. *altus*, high; mid. L. *boscus*, a bush]: wind instrument of the 'reed' genus. On account of its piercing sound, it was much used in military bands, in the middle of the 17th c., for playing the melody, and from it the whole band used in Germany to be called *Oboisten*. The hautboy, at an early date, took its place as one of the essential instruments of the orchestra. It is made of wood, generally of box, ebony, cocoa, or rosewood, and is constructed in three pieces, or joints, forming a continuous tapering tube, about 21 inches long, the bore of which is narrow at the small end, and widens into a bell-shaped opening, 1½ inch in diameter, at the mouth. In the upper and middle piece there are holes by stopping or opening which with the fingers, the player forms the notes of the natural scale, the intermediate semitones being formed by the keys. The reed is fixed upon the end of a small brass tube which fits, socket-wise, into the small end of the upper piece. Originally, it had but two keys, but others have from time to time been added, till the number is now usually 15, sometimes more. Its ordinary scale is that of C natural, but by means of the keys it can be played in every key with facility. Its range of available notes is from B to G in alt.

Hautboy is also the name given by organ-builders to a reed stop of eight ft. tone, made of metal, similar in shape

to the real hautboy, and intended to imitate it in its sound Its reed is made of thin brass. In all English and many Americans organs it is an indispensable stop in the swell, where it is most effective. It is only a treble stop, of which the bass is the bassoon. In European continental organs it is found of various scales, and when very fine, is called the *Obe d'amour*.

HAUTBOY, *hō'boy:* a large sort of strawberry, having long stalks; the *Fragărĭă elātĭŏr*, ord. *Rosācĕæ*.

HAUTEUR, n. *hō-tėr'* [F. *hauteur*, height—from *haut*, high—from L. *altus*]: haughtiness; insolent manner or spirit.

HAUT-GOUT, *hō-gô*. [F.—from *haut*, high; *goût*, taste—from L. *gustus*, taste, flavor]: high seasoning; high relish or flavor.

HAÜY, *â-wē'*, Rene Just: 1743, Feb. 28—1822, June 3; b. St. Just, Picardy: French mineralogist. He studied for the priesthood, and took priest's orders. His attention was early turned to botany, but it was not until he was 38 years of age that, in consequence of accidentally hearing Daubenton lecture on the subject in the Jardin des Plantes, he commenced the study of mineralogy. Linnæus had already shown that the regular form of crystals is due to the action of forces which obey definite laws, and Romé de Lisle had ascertained that the angles are constant in different crystals of the same variety; but the true laws of crystallization remained unknown until Haüy was led to their discovery by a fortunate accident. See his memoirs on crystallography and mineralogy, amounting to about 100, published 1782–1821. (For their titles and dates, see Poggendorff's *Biog. Liter. Handwörterbuch*, pp. 1038–40). His most important works are his *Traité de Mineralogie* (Paris 1801, 4 vols. with atlas), 2d ed. 1822–3; *Traité Elementaire de Physique* (Paris 1804, 2 vols.), 3d ed., 1821: *Traité des Caracterès Physiques des Pierres Précieuses*, 1817; and *Traité de Crystallographie*, 2 vols. with a vol. of plates, 1822. He was a contributor to the *Encyclopédie Méthodique*, and the *Dictionnaire d'Hist. Nat.* For Haüy's narrow escape during the revolution, see the memoir of Geoffroy Saint-Hilaire. In 1793, he was appointed on the Commission of Weights and Measures; 1794, conservator of the Cabinet des Mines; 1795, teacher of physics at the Normal School; finally, 1802, he was appointed prof. of mineralogy in the Museum of Natural History and in the Faculty of Sciences. He was an honorary canon of Notre Dame, and is, in, consequence, generally known as the Abbé Haüy. He died leaving no wealth beyond the collection on which he had based his great discoveries, and which is now preserved in the Jardin des Plantes. Though his latter years were clouded by poverty, his characteristic cheerfulness and serenity were unfailing.

HAUYNE, n. *how'ĭn* [after M. *Haüy*]: a mineral of the sodalite group, occurring in certain igneous rocks, and notably in the lavas of Mt. Vesuvius. It is a silicate and

HAVANA FROM CABANAS.

sulphate of sodium, calcium and aluminum, crystallizing in the isometric system. It is usually translucent with a vitreous lustre, a hardness of from 5.5 to 6, and a specific gravity of about 2.45. Haüynite is commonly blue or green, though red and yellow specimens are also known.

HAVANA, *ha-văn'a*, or HABANA, *hâ-bâ'na* [Eng. *The Harbor*]—in full, San Cristobal de la Havana: city, cap. of the island of Cuba, on an inlet of the Gulf of Mexico on the n. shore of the island; lat. 23° 8′ n., long. 82° 22′ w. It has one of the finest harbors in the world, to which entrance is gained through a narrow channel three-eighths of a m. long, which opens into a large basin or inner harbor sufficient in dimensions and depth of water to accommodate nearly 1,000 vessels of any size, and provided with capacious and substantial wharves. The outer harbor is defended by Morro and Punta castles, La Cabana citadel, and other fortifications. Havana is divided into the old or walled town and the new one beyond, and its most attractive part is the great public square—La Plaza de Armas—and its vicinity. After this are the Alemeda de Paula, skirting the bay, the Parque de Isabel, and the magnificent drive, the Paseo de Tacon. On the w. side of the Plaza de Armas is the governor's palace, a two-story colonnaded building painted yellow, and opposite that is the pretty chapel, El Templete, built on the spot where the first mass was celebrated after the removal of the city to its present site. The Rom. Cath. cathedral, foremost among the public buildings, was erected 1724, and used as a college by the Jesuits till 1789. The ashes of Christopher Columbus are popularly supposed to have been transferred from the cathedral at San Domingo to that at Havana 1795, but many historians believe the true remains were never disturbed. (See COLUMBUS, CHRISTOPHER.) Havana contains 15 other churches, 9 attached to monastic orders, 2 San Catalina and San Juan de Dias, dating from the 16th c., one, San Augustine, from the beginning of the 17th c.; all noted for richness and splendor of decorations. Other public buildings of note are the Tacon and La Paz theatres, Louvre, and the world-famed Casino club-house. The architecture of the business houses and residences is almost identical with that of s. Spain. The houses are usually of stone, with thick walls and tessellated floors, two stories in height, with flat, tiled roofs, which form the family rendevous in hot evenings. Every prominent dwelling has covered verandas to which the apartments open directly, and a *patïo*, corresponding to the Mexican court-yard, in which there are usually a fountain and an abundance of flowers and plants. About 50 public fountains are scattered over the city. Havana has a univ. and many educational institutions, a superb botanical gárden, and numerous scientific and charitable establishments. It is lighted with gas and electricity, has railroad connections with Cardenas, Matanzas, Santiago, and other important places on the island; submarine cable to Fla. and Jamaica, and steamship communication weekly with the United

States, Spain, France, and England. The chief industry is the manufacture of tobacco in various forms, for which there are over 100 first-rank factories; there are also tanneries, breweries, distilleries, carriage, candy, soap, candle, glycerine, and perfumery factories. The bulk of the Cuban trade passes through Havana, the exports consisting chiefly of sugar, molasses, rum, cigars, and tobacco. The principal imports are flour, jerked beef, salt fish, and other food stuffs, hardware, and cotton goods. Since the beginning of the 20th c. the commerce of Havana has increased considerably; the aggregate value of the foreign commerce annually being about $75,000,000; imports representing $50,000,000. The principal trade is with the U. S., amounting to an average of $32,000,000 annually; the American shipping aggregates annually about 1,000,000. tons. Over 3,275 vessels of about 2,078,125 tons enter the port of Havana yearly, on an average the same number clearing. Pop. 275,000, of whom about 23 per cent. are foreign born.

The Bay of Havana was first entered by Spaniards under Sebastian de Ocampo in 1508. Diego de Velasquez in 1515 established a city on the south coast, but three years later the inhabitants removed to the present site. It became the leading naval station of Spain in the Western Hemisphere, was frequently attacked by buccaneers, by the English under Drake (1585), by the Dutch during the 17th c., and by the English in the 18th c., who captured the city in 1762, but restored it to Spain the following year. In 1802 it was almost destroyed by fire, but under Gov. Tacón was rebuilt in substantial style. It was the storm centre of Cuban revolt against Spanish rule which culminated in the horrors of the 'reconcentrados' regime under Captains-General Weyler and Blanco during 1895–98, when to subdue the rural population the inhabitants were driven in and concentrated near the cities in insanitary camps. The protests of the U. S. and other civilized nations against the inhuman methods and hostile demonstrations against American residents and interests, led to the visit of the U. S. battleship Maine on a friendly mission, but 1898, Feb. 15, it was blown up by a submarine mine in Havana harbor and 260 lives were lost. The responsibility for the disaster was not fixed, but war with Spain ensued and the city and harbor were blockaded by the American fleet, which captured several merchant vessels, and on July 6 destroyed the Spanish cruiser Alfonso XII when it attempted to escape. On Aug. 12, hostilities ceased, evacuation commissions were appointed, and on 1899, Jan. 1, with the withdrawal of the last Spanish troops, the sovereignty of Spain over Cuba ended and the U. S. flag was hoisted over the governor's palace of Havana and the fort.

The city was discovered to be in a shocking insanitary state, but a systematic inspection was instituted and a wholesale renovation and disinfection established, with an immediate beneficial effect. The American troops evacu-

COLON PARK. HAVANA

ated Cuba 1900, May 20, and the island republic was inaugurated with Estrada Palma as first president. In 1906 the armed revolt of the Liberal party against Palma's republican rule led to U. S. intervention, the pacification measures of Sec. Taft's commission, and the appointment of C. E. Magoon as provisional governor.

HAVE, v. *hăv* [Goth. *haban* AS. *habban;* Icel. *hafa;* Ger. *haben;* L. *habĕrĕ*, to have]: to possess or hold; to enjoy; to be under necessity or impelled by duty, as you will *have* to do it; to desire, as 'I *had* rather be a doorkeeper in the house of my God'; to buy; to hold opinion; to bring forth. HAV'ING, imp.: N. in *OE.*, the act or state of possession; possessions; fortune. HAV'INGS, n. plu. belongings. HAD, pt. and pp. *hăd*. TO HAVE AT, to assail; to attack. TO HAVE ON, to wear, as dress. TO HAVE IT OUT, to come to an explanation; to speak one's mind. *Note.*—When used as an auxiliary, the completion of the sense is expressed by the verb which follows. TO HAVE A CARE, to take care; to guard. The phrase, *I had rather*, is generally regarded as a corruption of *I'd rather*—that is, *I would rather;* but this supposition appears somewhat gratuitous, seeing that *I had rather* is an old and correct Eng. phrase, though identical in meaning with *I would rather.* HAVE AFTER, OR WITH, or AT, in *OE.*, done! agreed!—SYN. of 'have': to own; obtain; take; hold; maintain; accept; wish; desire.

HAVEL, *hâ'vĕl* river of n. Germany, a considerable tributary of the Elbe. Its origin is in a small lake a mile w. of the town of New Strelitz, Mecklenburg. It flows s. to Pots am, thence w. and n.w. to its junction with the Elbe, opposite Werben; entire length 218 m.; navigable to Furstenberg, a town within 30 m. of its source. The Havel which throughout a considerable part of its course is the connecting link to a long chain of lakes, is of great importance to the internal trade of Prussia. Of its affluents, the Spree, which is longer than the Havel, is the only one worthy of mention.

HAVELOCK, n. *hăv'lŏk* [named after Gen. *Havelock*]: a light covering for the head and neck worn by soldiers as a protection against sunstroke.

HAVELOCK, *hăv'ĕh-lŏk*, SIR HENRY. K.C.B., Major-General: 1795, Apr. 5—1857, Nov. 24; b. Bishop-wearmouth, Durham, England; son of a merchant and shipbuilder. He entered the army a month or two after the battle of Waterloo, went to India 1823, and gained distinction in the Afghan and Sikh wars. In 1854 he was made adj.gen. of the troops in India, and 1856, he commanded a division of the army that invaded Persia. While in that country, he heard of the Indian mutiny, and hastened to Calcutta. He was directed to organize a small movable column at Allahabad, and to push on to the relief of the British at Cawnpore and Lucknow. He made a forced march to Futtehpûr, where, at the head of 2,000 men, he engaged and broke the rebels, 1857, July 12. He con-

tinued his march on Cawnpore, and twice defeated the enemy, first at Aeng, and then at the bridge over the Pandu Nuddi, 8 miles from Cawnpore. The consequence of the latter victory was the massacre of all the European women and children in the hands of Nana Sahib. Havelock had another battle to fight at Ahirwa, where the rebels were strongly entrenched. He turned their left, and the 78th Highlanders carried the village in a splendid charge. He then entered Cawnpore, where he and his men beheld the mutilated bodies of the European women and children. The sight steeled their hearts, and the avenging column quited Cawnpore to advance on Lucknow. Havelock crossed the Ganges, and repulsed the rebels at Unao, and afterward on the same day at Busserut Gunge. After eight battles with the rebels, in all of which he was victorious, his little army found itself so thinned by fatigue and sickness, that it was compelled to retire on Cawnpore. Early in Sep., Gen. Outram arrived with reinforcements and Havelock again advanced to the relief of Lucknow; Outram, with chivalrous generosity, refusing to take the command out of his hands. Havelock's relieving force, which mustered 2,500 men and 17 guns, routed the enemy at Mungalwar, and next engaged them at the Alum Bagh, an isolated building about three miles from the residency of Lucknow. Havelock and his column, with desperate bravery against overwhelming numbers of the enemy, fought their way through streets of houses, each forming a separate fortress, until they gained the Residency, Sep. 25, to the indescribable joy of the beleaguered garrison. The victorious army were now in turn besieged, but held their own until Nov., when Sir Colin Campbell (Lord Clyde) forced his way to their rescue. After the relief of Lucknow, Havelock was attacked by dysentery, which caused his death there. Before his death, news arrived of his elevation to the distinction of K.C.B. Other honors were in store for him, but they came too late. He was made maj.gen.; appointed to the colonelcy of the 3d Foot; and received a baronetcy, with a proposed pension of £1,000 a year. The rank and the pension were given to his widow. A metropolitan statue, raised by public subscription, was erected to his memory in Trafalgar Square.

HAVEN, n. *hā'vn* [Dut. *haven;* Icel. *hofn;* OF. *havene;* F. *havre,* a haven]: a harbor; a port; a place of safety; a shelter: see HARBOR. *Note.*—HAVEN, in the same sense, assumes the various forms of *hope*—as in *St. Margaret's Hope* in Orkney—*hoff, howff,* and *haaf.*

HA'VEN, *hā'vĕn,* ALICE BRADLEY, American author: b. Hudson, N. Y., 1828; d 1863. Her maiden name was Emily Bradley, and while a school girl she sent under the pseudonym of 'Alice G. Lee' many sketches to the Saturday *Gazette,* then recently established by Joseph C. Neal in Philadelphia. She was married to Mr. Neal in 1846, and at his request assumed and retained the name of Alice. On the death of her husband in 1847, she conducted the *Gazette* for several years. She published in 1850 *Gossips*

of Rivertown, with Sketches in Prose and Verse, and became widely known by her series of juvenile stories, as *Helen Morton, Pictures from the Bible, No such Word as Fail, Patient Waiting no Loss, Contentment Better than Wealth, All's not Gold that Glitters, Out of Debt Out of Danger*, etc. In 1853 she was married to Mr. Samuel L. Haven.

HAVEN, Erastus Otis, d.d., ll.d.: 1820, Nov. 1—1881, Aug. 3; b. Boston; bishop of the Meth. Episc. Church. He graduated at Wesleyan Univ. 1842, conducted a private acad. at Sudbury, Mass., was principal of the Amenia Seminary, N. Y., 1846–48, entered the Meth. Episc. ministry 1848, became prof. of Latin in the Univ. of Mich. 1853, and of English language, literature, and history 1854; was editor of *Zion's Herald* 1856–63, member of the Mass. board of education 1858–63, pres. of the Univ. of Mich. 1863–69 and of the Northwestern Univ., Ill., 1869–72, chancellor of Syracuse Univ. 1874–80, and was elected bp. 1881, May 12. He published, *The Young Man Advised* (1856); *Pillars of Truth* (1866); and *Rhetoric* (1866), and received the degree d.d. from Union College 1854, and ll.d. from Ohio Wesleyan University.

HA'VEN, Gilbert, d.d.: 1821, Sep. 19—1880, Jan. 30; b. Malden, Mass.: bishop of the Meth. Episc. Church. He graduated at Wesleyan Univ. 1846 became teacher in Amenia Seminary, N. Y., and succeeded the Rev. Erastus O. Haven as principal 1848, entered the Meth. Episc. ministry 1851, received the first commission as chaplain in the army at the beginning of the civil war, travelled extensively in Europe 1862, was assigned to special duty in Miss. 1865, became editor of *Zion's Herald* 1867, and was elected bishop 1872. In the discharge of duty he visited nearly every state in the Union as well as Liberia and Mexico, and had a large share in the educational work of his church among the freedmen. He was a frequent contributor to periodical literature, and published *The Pilgrim's Wallet, National Sermons, Life of Father Taylor, The Sailor-Preacher* (1871), and *Our Next-Door Neighbor, or a Winter in Mexico* (1875).

HA'VEN, Joseph, d.d., ll.d.: 1816, Jan. 4—1874, May 23; b. Dennis, Mass.: Congregational minister. He graduated at Amherst College 1835, and at Andover Theological Seminary 1839; was pastor of the Congregational Church in Ashland, Mass., 1840–46, and Harvard Church, Brookline, 1846–50; prof. of mental and moral philosophy in Amherst College 1850–58 and of systematic theology in the Chicago Theol. Seminary 1858–70; resigned, travelled in Europe and the East; and preached and lectured on ancient and modern philosophy and English classics till 1873, when he became acting prof. of mental and moral philosophy in the Univ. of Chicago, where he continued till death. His publications include *Mental Philosophy* (1857); *Moral Philosophy* (1859); *Studies in Philosophy and Theology* (1869), and *Systematic Divinity* (posthumous pub. 1875). He received the degree d.d. from Marietta College 1859

and Amherst College 1862, and LL.D. from Kenyon College 1862.

HAVER, v. *hā'vėr* [Gael. *abair*, to speak]: in *Scot.*, to talk foolishly or irrelevantly. HA'VERING, imp. HAVERED, pp. *hā'vėrd.* HAVERIL, n. *hā'vĕr-ĭl*, one who talks foolishly about a matter.

HAVER, n. *hăv'ėr* [*have*, possess]: in *OE.*, one who holds or has; a possessor. HAVERS and EXHIBITS, the possessors of documents and the producers of them. HAVERS, n. plu. *hăv'ėrz*, in *Scots law*, those who have the possession or custody of documents necessary to be produced in the conduct of litigation; a holder. EXHIBITS, n. plu. *ĕgz-hĭb'ĭtz* [L. *exhibĭtus*, shown or displayed]: the writs and documents produced by a *haver.*

HAV'ERFORD COL'LEGE: in Haverford, Del. co., Penn., 8 m. n.w. of Philadelphia; founded by Philadelphia, New York, and New England members of the Soc. of Friends 1832; originally designed as a school for the advanced and collegiate education of young men belonging to the soc., opened to others than Friends 1849, and created a college with authority to grant degrees 1856. It was the first institution of a collegiate character established and conducted entirely by the Soc. of Friends; is richly endowed; has two astronomical observatories, scientific laboratories, mineralogical and geological cabinets, gymnasium, large and choice library of over 45,000 volumes, and a handsome alumni hall; and occupies about 250 acres with its buildings, superb lawn, and farm. It accommodates a limited number of resident students; and has 20 professors and about 150 students.

HAVERGAL, *hăv'ėr-gal*, FRANCIS RIDLEY: 1836, Dec. 14 —1879, June 3; b. Astley, Worcestershire, England: author. She began writing hymns and religious verse when 7 years old, was educated in the Louisenschule at Düsseldorf, returned to England and began studying German, French, and Greek and taking an active part in Sunday-school and other religious work 1854, and first published her poems in *Good Words* 1860. Her last ten years were passed in writing religious books and hymns, and in temperance, hospital and missionary work.

HAVERHILL, *hā'vėr-ĭl:* city in Essex co., Mass.; on the Merrimack river at the head of tidewater and navigation; on the Boston and Maine railroad; 18 m. from the sea, 33 m. n. of Boston. It extends 12 m. along the river with an average width of 3 m., contains several picturesque hills, 5 lakes, 27 parks, and Ayer's and Rocks villages, is connected by bridges over the Merrimack with West Newberry and Groveland the last of which was annexed to Haverhill in 1897 and now forms a part of the city and since its great fire (1882, Feb. 18) Haverhill has been substantially and tastefully rebuilt.

Public Buildings, Schools, etc.—The Public Library was founded in 1875 by the generosity of E. J. M. Hale, and contains nearly 100,000 volumes, with an annual circula-

tion of nearly 160,000. There are four branch libraries for the accommodation of the more remote parts of the city, and several loan libraries. The Hale Hospital occupies a set of buildings of the most modern type and equipment. There are also a city hospital, city almshouse, children's home, old ladies' home, several churches, the Hannah Dustin and soldiers' monuments. Haverhill has street railroad, gas and electric lighting, an efficient fire department, and a plentiful supply of water obtained from two of the lakes within its limits. The Historical Society occupies the 'Buttonwoods,' a large old mansion house on Water street. The Whittier homestead, the birthplace of the poet, John Greenleaf Whittier and the scene of his poem *Snow Bound* is situated about three miles from the heart of the city on the Merrimac road. The Y. M. C. A. occupies a magnificent set of buildings, including a thoroughly equipped gymnasium. The public school buildings are 34 in number, their aggregate value being $649,150. There are 167 teachers employed in the day schools, and an enrollment of 5,552 pupils. There are three parochial schools, Saint James (Irish), Saint Joseph's (French) and the Brothers of the Sacred Heart (French). Haverhill is also the seat of Bradford Academy, a famous and flourishing school for young ladies, established in 1804.

Manufactures, etc.—The city has many and varied manufactures, the number of manufacturing establishments of all kinds being nearly 700, with an aggregate capital of $25,000,000. The average number of wage-earners employed is 10,600, to whom is paid an aggregate of $5,035,882. The principal manufactures are those connected with the boot and shoe industry. There are 151 manufactories of boots and shoes, with an aggregate capital of $3,325,717, and an annual production valued at $15,231,440; 98 manufactories of cut stock, aggregate capital, $641,927, value of product, $3,495,433; 22 manufactories of boot and shoe findings, capital, $262,586, value of product, $811,515. The number of cases of shoes annually sent forth is about 450,000. Other important industries are hat and woolen manufactures, box making, brick making, machine building, etc. The assessed valuation of the city is about $30,000,000. The net bonded debt, 1904, Jan. 1, was $1,246,886.05. The interests of the business community are served by six national banks, having an aggregate capital of $795,000. There are three savings banks, two co-operative banks with an authorized capital of $1,000,000 each, and a safe deposit and trust company.

Government and History.—The municipal government is administered by a mayor, board of aldermen consisting of seven members, one from each ward of the city, but elected by the votes of the whole city, and 14 councilmen, two from each ward of the city and elected by the votes of the ward. These officials are elected annually and hold office for a single year. Haverhill, the Pentucket of the Indians, was settled 1640, incorporated as a town 1645,

was the scene of Hannah Dustin's marvellous escape from Indians 1697, was several times attacked by Indians, furnished nearly 100 men for the battle at Bunker Hill, was the birthplace of John Greenleaf Whittier 1807 Dec. 17, built the first steamboat that navigated the Merrimack river 1828, and was chartered as a city 1869. Haverhill has suffered from several disastrous fires, one in 1775 which destroyed 17 buildings in the little town; one in 1873, which burned out 35 business houses, and the most disastrous one of 1882, Feb. 17, which burnt out about 300 business firms and distroyed about $2,000,000 worth of property. On Nov. 6, 1888 the City Hall, built in 1861, was gutted by fire, but it was immediately rebuilt. Pop. (1910) 44,115.

HAVERS, *hăv'ĕrz*, Clopton, M.D.: anatomist and physician, who, after studying at Cambridge and Utrecht, where he graduated, settled in London 1687. The dates of his birth and death are not known. His *Osteologia Nova or Some New Observations of the Bones and the Parts belonging to them* (8vo. Lond. 1691), was long a standard work, and his name is indelibly recorded in the annals of anatomy as the discoverer of the Haversian canals in bone (see Bone). He edited *The Anatomy of Man and Woman, from Spacher and Remmelin* (folio, Lond. 1691) and was a contributor to the *Philosophical Transactions.*

HAVERSACK, n. *hâv'ĕr-săk* [F. *havre-sac;* Ger. *haber-sack*, an oat-bag, a knapsack—from Ger. *haber* or *hafer*, oats, and *sack*, a bag: Scot. *haver-sack*—from *haver*, oats, and *sack*]: bag usually of strong canvas, in which, on a march or in service each soldier carries his own provisions: it is borne on the left side by a strap passing over the right shoulder, and is used only in the field and in cantonments: in *Scot.*, a bag hung at a horse's mouth containing his oats.

HAVERSIAN-CANALS, *hă-vĕr'sĭ-ăn-* [after *Havers*, their discoverer]: very complicated apparatus of minute canals discovered in the substance of bone, by Clopton Havers. See Bone.

HAVERSTRAW, *hăv'ĕr-straw:* town in N. Y. on the w. bank of the Hudson river where it expands into Haverstraw bay, and on the West Shore, the New Jersey and New York railroads, 37 m. n. of New York. Haverstraw is noted for the extensive manufacture and quality of its brick products, and steamboats and other vessels carry on an active trade with New York. Haverstraw was settled by the Dutch in 1710. Stony Point, famous in the history of the Revolution is in this township and at West Haverstraw is the 'Old Treason House' where Arnold and André met 1780, Sep. and arranged for the surrender of West Point. The 'Haverstraw Community' organized here in 1825 lasted but a few years. Pop (1910) 5,669.

HAVILDAR, n. *hăv'ĭl-dâr:* a sergeant, highest non-commissioned officer of the native troops in India. Havildar-major, native sergeant-major in the Indian army.

HAVOC, or Havock, n. *hăv'ŏk* [W. *hafog*, destruction,

waste; *hai hafog*, a cry to cows when committing waste in a field; AS. *hafoc*, a hawk]: wide and general destruction: devastation; in *OE.*, the cry of the soldiers when no quarter was given.

HAVRE, *hâv'ĕr*, F. *âv'r*, LE (contraction of the original name, LE HAVRE DE NOTRE DAME DE GRACE): town second in size in the dept. of Seine-Inférieure, and, next to Marseilles, the chief commercial emporium of France; on the n. side of the estuary of the Seine, lat. 49° 29′ 16″ n., long. 0° 6′ 37″ e.; 108 m. n.w. of Paris, in a straight line. H. has direct communication with Great Britain, Holland, Hamburg, Portugal, Mexico, Brazil, United States, India, etc. It is the port of Paris, with which it is connected by a railway 143 m. long, and the continuation of this line to Strasburg affords such facility of communication with Germany, that the greater part of the trade of that country with America is carried on through H. For foreign trade, H. is the Liverpool of France; it receives annually from 500,000 to 600,000 bales of cotton, nearly three fourths of the whole quantity imported; it also ships most of the exports to America, and, generally speaking, has about one-fifth of the whole trade of the country. The trade with the United States is very large. The sum-total of its imports and exports average annually over 2,000,000 tons, valued at about $400,000,000. The imports consist of cotton spices, coffee, tea, sugar, timber, coal, etc.; exports, French manufactured goods, wine, brandy, oil, jewelry, provisions, etc. H. is fortified as a fleet station and harbor of war. It has important ship building yards, constructing war-vessels, steamers and sailing ships and has manufactures of paper, sulphuric acid, tobacco, cotton goods, starch, lace, oil, machinery, ropes, salt, etc., also sugar refineries; the annual value of the manufactures being estimated at $12,125,000. Its harbor is one of the most accessible in France, and is entered by a narrow channel formed by two long jetties stretching from e. to w., and which, owing to the current, requires little dredging. This channel leads to the *avant-port* (outer harbor), where the various passenger-steamers lie, and within this avant-port are capacious wet docks, capable of accommodating 500 ships. The largest of these is L'Eure, 700,000 sq. ft. Among the dry docks, one recently completed, 515 ft. long and 112 broad, is a stupendous work, and obviates the necessity for sending large steamers for repairs to Southampton. A new basin has been constructed in the plan of the Leure, covering about 53 acres. H. was, till 1884, surrounded by ramparts and lofty walls; but these were demolished, to admit of the extension of the town, which has now absorbed the neighboring communes of Ingouville and Graville l'Heure. Among public buildings are the churches of Notre Dame and St. Francis, the new city hall (in the style of the Tuileries), the tower of Francis I., exchange, mansion-house, arsenal, barracks, and a number of elegant villas which clothe the slopes of Ingouville. The principal institutions are a School of Navigation, a

School of Applied Geometry and a library containing 20,000 volumes. The greater part of the town is modern. H. was founded 1509 by Louis XII. on the site of a fishing village, and was intended as a harbor of refuge for the French navy. It was greatly extended and improved by his successor, Francis I., and from his time rapidly rose in importance, especially as the rival harbor of Harfleur was being gradually silted up with sand. The names of Richelieu, Colbert, Vauban, Napoleon, etc., are connected with the improvements and additions made to the original harbor. It was bombarded by the British 1694, 1759, '94, and '95. Under Louis XIV., it became the entrepôt and chief seat of operations of the French, E. India and the Senegal and Guinea Companies. Pop. 130,200.

HAVRE DE GRACE, *hăv'ėr dė grâs:* city in Harford co., Md.: on the Susquehanna river near Chesapeake Bay: on the Philadelphia, Wilmington and Baltimore railroad: 36 m. n.e. of Baltimore. It has a large trade in coal; is the outlet to tidewater for the lumber, minerals, manufactures and agricultural products of the valleys of the Susquehanna; has several ship-yards, breweries, flour, saw, and planing-mills, shad and herring fisheries, noted canvas-back duck waters, and a government fish hatchery. Pop. (1880) 2,816; (1900) 3,423.

HAW, n. *haw* [AS. and mid. L. *haga;* F. *haie;* Ger. *hag,* Dut. *haag,* a hedge, an inclosure: Icel. *hagi,* a hedged field]: the berry of the hawthorn; a gristly excrescence under the nether eyelid of a horse; the white of the eye in a horse. HAWTHORN, n. *haw'thawrn* [*haw* and *thorn:* Gael. *uath,* the white thorn]: a common prickly tree or shrub, used in Britain for hedgerows; the *Cratægus oxyăcan'tha,* ord. *Rosăcĕæ:* see HAWTHORN (below). HAW-HAW: see under HA.

HAW, v. *haw* [an imitative word]: to make sounds like *haw, haw,* between one's words in speaking. HAW'ING, imp.: N. hesitation. HAWED, pp. *hawd.* HEMS AND HAWS: see under HUM.

HAW, BATTLE OF THE, in the Revolution, 1781, Feb. 21. Henry Lee had been commissioned by Greene to prevent Tory reinforcements coming to Cornwallis, who had taken position at Hillsboro: and in the course of the movement attempted to surprise Tarleton. Tarleton had moved; but hearing that about 400 Tories under Col. Pyle were on their way to join him, Lee determined to pass off his own 'legion' as Tarleton's and capture them all. Forcing two captured British officers to keep up the deception, he moved forward, with Pickens' and Oldham's companies following, and met two young men who had been sent by Pyle to find Tarleton's camp; he was presented to them as Tarleton, and directed them to have Pyle's men drawn up beside the road while his 'weary veterans' passed. The plan succeeded perfectly till part of the Tories discovered Pickens' militia and saw the trap, and at once

fired on the American rear; the latter poured in a volley that killed 90 of the enemy at the first fire, and a great number of the rest were killed and the majority wounded.

HAWAII: a territory of the U. S., formerly called SANDWICH ISLANDS: archipelago in the Pacific Ocean between n. lat. 19° and 22°, and w. long. 155° and 160°. The group of islands was discovered by Capt. Cook 1778, and was named by him Sandwich Islands in honor of Lord Sandwich, at the time first lord of the admiralty in the Brit. govt. But that name has gone out of use and the group is now known as the Hawaiian Islands or simply Hawaii, properly the name of the largest and easternmost island of the archipelago. As a state or government the official style is Territory of Hawaii. There are 12 islands with a total area of 6,454 sq. m. Advancing westward from the e. extremity of the group, the first island is Hawaii, area 4,015 sq. m.; then follow Mauii, 728 sq. m.; Kahoolawe, 69; Lanai, 139; Molokai (on which is a colony of lepers), 261; Oahu (in which is Honolulu, cap. of the republic), 598; Kauai, 547; Niihau, 97. Besides these 8, there are 4 other islands, but they are naked rocks and uninhabited—Molokini, Lehua, Kaula, and Nihoa. The cap., Honolulu, is distant 2,100 m. from San Francisco, 3,440 from Yokohama in Japan, 3,810 from Auckland in New Zealand, and 4,410 from Sydney in New South Wales.

Surface Features and Volcanic Phenomena.—The islands are of volcanic origin and all are mountainous. They rise in some cases precipitously out of the sea, presenting a front of vertical cliffs from 1,000 to 3,000 feet high. The surface of the island Hawaii is diversified by 4 great mountain masses, viz., Mauna Kea (highest peak, 13,805 ft.) in the n.—this is the highest mountain in any island of the Pacific; Mauna Loa (greatest elevation 13,675 ft.) in the s., an active volcano; Mauna Haulalai (8,275 ft.) in the w.; and Mauna Kohala (5,500 ft.) in the n.w. Mauna Kea in its principal elevations presents a number of truncated cones out of which rise numerous extinct craters. Its sides rise at a gentle gradient so that the platforms out of which the crater cones project may be visited on horseback. The crater of the active volcano of Mauna Loa is 9½ miles in circumference, and on the inner side the walls, which are nearly perpendicular, rise to the height of 500 ft. From the floor of the crater, usually covered with indurated lava, rise numerous cones: when the volcano is quiescent sulphurous acid gas and steam are emitted through fissures. The first recorded eruption of Mauna Loa occurred in the year 1832, and a more violent eruption occurred 1843: there were three streams of lava, more than 20 m. long. Mauna Loa was again destructively active in the years 1851, '52, '55, '59, '68, '80–81 (duration, 9 mos.), '87 and 1899. The eruption of 1859 continued for seven mos.: the stream of lava was 33 m. long and 1 m. wide; it reached the sea in 8 days. Less grand and imposing as a spectacle,

the eruption of 1868 was not less terrible in its direct effects; the attendant earthquakes producing such commotion in the adjacent waters that a great wave of the sea, 40 ft. high, broke on the shore. In 1877 there was a submarine eruption to the west. In 1887 the stream of lava flowed 6 days. Kilauea, 16 m. s.e. of the principal elevation of Mauna Loa, has a crater 8 m. in circumference, and in that respect is pre-eminent among active volcanoes. There is authentic record of an eruption of Kilauea in 1789; between that year and 1823 there is no memory of any extraordinary activity of this volcano. The great crater of Kilauea rises out of a plain 4,000 ft. above the sea level: interiorly its walls rise vertically to the height of 1,000 ft.: at the bottom, when the volcano is moderately active, is a lake of liquid, boiling lava. In 1840 Kilauea sent forth a stream of lava through a crater 27 m. distant from the great caldron on its summit; this stream was half a mile wide, and reached the sea by a winding course of 40 m. The crater of the extinct volcano Mauna Haleakala on the isle of Maui has a circumference of 20 m.: its walls inside are from 700 to 2,000 ft. high; the rim of the crater is 10,000 ft. above sea level.

Climate, Rivers, Soil, etc.—The islands, though within the tropics, enjoy a temperate climate with equable temperature. The n.e. trade-winds, which blow for 9 mos., bring frequent rains to the mountainous districts on the e. coasts, but on the leeward slopes rain seldom falls. During the 3 mos., Jan., Feb., and Mar., a strong s.w. wind prevails, and occasionally there is an unpleasant hot, damp wind from the equatorial region. At Honolulu, which is on the leeward side of Oahu, the mean annual rainfall is abt. 38 in.; lowest temperature 54° Fahr., highest 87° Fahr. The soil in general is fertile, with considerable tracts of desert, where the volcanic rocks have not been transformed or disintegrated by weathering and the growth and decay of vegetation for long periods. There is abundance of good pasturage, and cattle-breeding and sheep husbandry are considerable industries. Dense forests clothe the mountain slopes on the windward side. Sugar-cane is extensively cultivated in the plains; Indian corn and rice are staple products. Tropical and semi-tropical fruits meet with favorable conditions on the islands. On the larger islands the rivers are numerous, though of course small; systematic irrigation can be cheaply effected.

Commerce.—Till 1871 the traffic of the islands was mostly with the whaling vessels engaged in the whale-fishery of the Pacific; but in that year the entire fleet was destroyed in the Arctic Ocean. In 1876 a reciprocity treaty was concluded with the United States, under which the export of sugar quickly grew to considerable proportions. The value of sugar plantations in the islands was, 1890, estimated at $32,347,690: the owners were nearly all citizens of the United States or descendants of the missionaries and early American settlers. The labor

Area in Square Miles, 6,449
Number of Districts, 24.
Population, 154,001.
Capital of Territory, Honolulu.
HAWAII
SCALE OF MILES
0 5 10 20 30 40 50
KAUAI
NIIHAU
OAHU
MOLOKAI
LANAI
MAUI
KAHOOLAWE
HAWAII
HONOLULU
HONOLULU
AND VICINITY
SCALE OF MILES
0 ½ 1 2 3
PACIFIC OCEAN
KAMUKAHI CHAN.
KAIEIE WAHO CHANNEL
KAIWI CHANNEL
KEALAIKAHIKI CHAN.
ALENUIHAHA CHANNEL
THE PEARL LOCHS
Pearl Harbor
Pearl R.
Pearl R. Entrance
Kalihi Cr. Entrance
Breakers
Punchbowl
Nuuanu Valley
Puu Ohia (Tantalus)
Mauna Kea
Mauna Loa
Kilauea Crater
Volcano House
Kalapana
Hilo
Honolulu Ldg.
Kawaihae Har.
Kealakekua
Napoopoo
Kailua
Kawaihae B.
Kauna Pt.
Kalae Pt.
Honuapo
Kaalualu Har.
Longitude West from Greenwich

was done principally by Japanese, 28,832 of 44,048 employed on the plantations in 1910 being of that nationality. There were about 75,000 acres under sugar culture. The year's export of sugar was valued at $42,625,474, as compared with $37,632,758 for the preceding year. Coffee was an important article of export till 1880, but declined steadily till 1893-4, when renewed interest was taken in the culture and about 10,000 acres are now planted. Rice is the principal crop next to sugar, but is consumed chiefly in the Territory. The principal exports, besides sugar, are: Rice, coffee, hides, and wool. The imports in 1910 amounted to $25,000,000; exports $46,000,000, about 65 per cent. of the trade being with the U. S. The public revenue of the year 1910 was $3,600,000; expenditure, $3,300,000; public debt, $3,959,000. The bonded debt assumed by the United States at annexation was $4,000,000. The amount which remained to be paid by the Territory of Hawaii was $951,000, which had increased by 1910, June 30, to $4,079,000. The taxes of the year ending 1910, June 30, produced $2,726,650. The receipts from customs, etc., which are remitted to Washington, average about $1,200,000 per annum.

Population.—The population, supposedly of Malay origin, was by Capt. Cook, 1778, estimated at 400,000; necessarily a mere guess and in all probability far in excess of the true number. Christian missionaries from the U. S. founded stations in the islands 1820; they made an informal census of the people 1823 and estimated their number at 140,000; 20 years previously a terrible pestilence had wrought great ravage among the islanders. Each successive census, until 1884, showed a marked decline in the population, which, 1832, was found to number 130,313; 1884, 80,578; and of this number only about one-half were natives, the rest being whites, Japanese, Chinese, and men of various other races, mostly laborers imported under contract to work on the sugar plantations. Population in 1910, by races: Hawaiians, 26,099; Part-Hawaiians, 12,485; Chinese, 21,698; Japanese, 79,663; Portuguese, 22,294; Americans, 7,283; other Caucasians, 14,684; Polynesians, 653; Negroes, 233; total, 191,909.

History.—It is almost certain that Juan Gaetano, a Spanish navigator, saw Hawaii in 1555 A.D., and named it 'La Mesa.' But the group remained unknown to the civilized world until Capt. Cook rediscovered it, 1778, Jan. 18. He landed the next day at Waimea, Kauai, where he held friendly intercourse with the natives, and sailed for Alaska Feb. 2. The Hawaiians looked upon him as an incarnation of their god Lono, and upon his crew as supernatural beings. Returning from the Arctic, he anchored in Kealakekua Bay 1779, Jan. 17. Here he received divine honors, and was loaded with presents of the best that the islands could produce. By his rash and arbitrary conduct, however, he involved himself in

an affray with the natives, in which he was killed 1779, Feb. 14.

Kamehameha, originally chief of the northern and western districts of Hawaii, after a series of sanguinary wars, became master of the whole island by the assassination of his rival, Keoua, at Kawaihae in 1791. He and his chiefs placed Hawaii under the protection of Great Britain, as represented by Capt. Vancouver 1794, Feb. 25. In 1795 he overran Maui and conquered Oahu, the decisive battle being fought in Nuuanu Valley back of Honolulu. In March, 1810, Kaumualii, the last king of Kauai, visited Honolulu in the ship *Albatross*, and acknowledged Kamehameha as his feudal suzerain, thus completing the union of the whole group under one government. Kamehameha I. died 1819, May 8, and was succeeded by his son, Liholiho or Kamehameha II. The ancient tabu system was abolished at a great feast given at Kailua in October, 1819, which was followed by the general burning of idols and temples throughout the islands. The adherents of the ancient faith took up arms, but were defeated in the battle of Kuamoo about 1819, Dec. 20.

The pioneer company of American missionaries arrived at Kailua, Hawaii, 1820, April 4, and met with remarkable success. Kamehameha II., accompanied by his queen and six chiefs, embarked for England 1823, Nov. 27. Soon after their arrival in London, the whole party was attacked by the measles, of which the king and queen both died. Their remains were conveyed to Honolulu on the frigate, *Blonde*, commanded by Lord Byron, arriving there 1825, May 6. Kaahumanu was then proclaimed as Queen-Regent, to govern during the minority of Liholiho's brother.

The first Roman Catholic missionaries arrived at Honolulu 1827, July 7, and soon gathered a congregation. Misunderstandings, however, soon arose, and on the charge that they were fomenting sedition, they were deported to San Pedro, Cal., in Jan., 1832. The King's minority expired in March, 1833, when he assumed the title of Kamehameha III.

The two banished priests returned from California in 1837, but were at first forbidden to land. The British sloop-of-war *Sulphur*, and the French frigate *Venus*, however, interposed in their behalf. The persecution of Catholics was put an end to by the King's edict of toleration 1839, June 17. On the 9th of July the French frigate *Artemise* arrived, commanded by Capt. Laplace, who immediately demanded the concession of equal rights and privileges to Catholics, and the payment of $20,000 in specie, threatening war, if this was not done before noon of the 12th. The required treaty was signed and the money promptly paid, contrary to his expectation. The first constitution was proclaimed 1840, Oct. 8.

In July, 1842, an embassy was sent to the United States and Europe to ward off impending dangers. In order to forestall the intended visit of the French Admiral, Du Petit Thouars, the British consul caused the frigate,

Caryspori, Lord George Paulet, to be ordered to Honolulu, arriving there 1843, Feb. 10. Lord Paulet at once presented a series of unjust demands and claims for alleged damages, amounting to $80,000.00, threatening hostilities if they were not complied with. To prevent the intended seizure of the Islands, the King made a provisional cession, pending his appeal to the Home Government, and the British flag was hoisted over the group 1843, Feb. 25.

As soon as Admiral Thomas was informed of these proceedings, he sailed from Valparaiso, arriving at Honolulu 1843, July 25. He refused to accept the Provisional Cession, and restored the Hawaiian flag with impressive ceremonies on the 31st. Meanwhile the embassy had been successful in London and Paris, and in 1843, Nov. 28, England and France recognized the independence of the Islands, and reciprocally engaged never to take possession of them. In 1848 the ancient feudal system of land tenure was abolished.

In 1849 M. Dillon, the new French consul, trumped up a new set of petty grievances, and called in Admiral De Tromelin, with the frigate, *Poursuivante* and the corvette *Gassendi*. On the 22d of August, the Admiral presented ten demands, allowing the Government three days in which to comply with them. The demands were refused, upon which an armed force landed on the 25th and took possession of the fort and the custom house. The harbor was blockaded for ten days. The fort was dismantled and the King's yacht carried off by way of 'reprisal.'

The liberal constitution adopted 1852, June 14, has formed the basis for all succeeding constitutions. In 1854 negotiations were carried on for the annexation of the islands to the United States, and were still pending when the King suddenly died, 1854, Dec. 15. His adopted son and heir, Alexander Liholiho, succeeded him, under the title of Kamehameha IV. His reign was uneventful. His son, the 'Prince of Hawaii,' died in 1862, at four years of age. During the same year Bishop Staley arrived with a staff of clergymen, and commenced the Anglican Mission. The King died 1863, Nov. 30, and was succeeded by his brother, Lot Kamehameha. The reign of Kamehameha V. was memorable for the change in the constitution which he made, uniting the Nobles and Representatives in one chamber, and limiting the suffrage. He died 1872, Dec. 11, and with him ended the line of the Kamehamehas.

His cousin, William Lunalilo, was elected King by the Legislature 1873, Jan. 8. His health was already failing, and he died of pulmonary consumption, 1874, Feb. 3. The Legislature having been convened to decide between the rival candidates for the throne, viz. the Queen-Dowager Emma and David Kalakaua, elected the latter 1874, Feb. 12. Thereupon a mob, composed of Queen Emma's partisans, broke into the court house, and assaulted the legislators, but were dispersed by troops landed from the U. S. SS. *Tuscarora* and *Portsmouth*, and from H. B. M.'s ship *Tenedos*.

The most important event of Kalakaua's reign was the conclusion of a treaty of commercial reciprocity with the United States, which was ratified in June, 1876. Unlike his predecessors, his chief aim seemed to be to change the system of government into a personal despotism, and to gain unchecked control of the Government Treasury. Matters came to a crisis in July, 1887, when he was compelled to sign a revision of the constitution, which put an end to personal government, and made the ministry responsible to the Legislature. The reactionary party, led by one R. W. Wilcox, made an insurrection 1889, July 30, which was promptly put down, but not without bloodshed. In order to recruit his failing health, the King visited California, and died in San Francisco, 1891, Jan. 20. His remains were brought to Honolulu in the U. S. S. *Charleston*, arriving there 1891, Jan. 29.

On the same day his sister, Lydia, was proclaimed Queen under the title of Liliuokalani. The history of her brief reign shows her unaltered purpose to establish autocratic government. Finally, immediately after the prorogation of the Legislature, 1893, Jan. 14, she undertook by a *coup d'etat* to abrogate the existing constitution, and to change the form of government into an absolute monarchy. At the critical moment, however, her cabinet drew back, and induced her to postpone the execution of her design. Again there was an uprising of the conservative part of the community, and on the 17th a Provisional Government was proclaimed with S. B. Dole as president. The U. S. S. *Boston* had landed a force on the 16th to protect the persons and property of Americans. The Queen, by the advice of her ministers, resigned under protest, in view (as she alleged) of the presence of U. S. troops on shore, appealing to the government of the United States to reinstate her in office. A treaty of annexation was negotiated with President Harrison, but was withdrawn by President Cleveland on the 9th of March.

The Republic of Hawaii was organized and proclaimed 1894, July 4. An insurrection of the ex-Queen's friends in January, 1895, was quickly suppressed, and its leaders imprisoned. In 1896, Jan 1, an amnesty was granted.

On the accession of President McKinley, a new treaty of annexation was negotiated and signed 1897, June 16, but was not pressed to a vote in the U. S. Senate. After long delays, a joint resolution, annexing the islands as a territory, passed both houses of Congress, and was signed by the President 1898, July 7. By the terms of this act the United States assumed the public debt of Hawaii, to an amount not to exceed $4,000,000, and prohibited all immigration of Chinese from other countries to Hawaii, and from Hawaii to the mainland of the United States. An act organizing the Territory of Hawaii was passed by Congress in April, 1900, and the new government was inaugurated 1900, June 14, with S. B. Dole as the first governor. On 1903, Nov. 23, George R. Carter became governor, being succeeded in 1907 by W. F. Frear.

HAWASH, *hă-wâsh:* river of Abyssinia, boundary bet. Shoa and the country of the Gallas tribes. It flows into Lake Aussa. The name Abyssinia (called Habesh by the Arabs) probably originated in that of the river.

HAWEIS, *hoyss,* Hugh Reginald: clergyman and author: b. Egham, Surrey, England, 1838, April 3; d. London, 1901, Jan. 29. He graduated at Trinity College, Cambridge, 1859; and was appointed curate of St. Peter's, Bethnal Green, of St. James the Less, Westminster, 1863, and incumbent of St. James', Marylebone, 1866. He served with distinction in the Italian revolution with Garibaldi, and was a popular preacher and liberal in his views. He was a very frequent contributor to the *Quarterly Review, Contemporary Review,* and *Good Words;* was editorially connected with *Cassell's Magazine* and *The Echo;* and published *Music and Morals, Thoughts for the Times, Speech in Season, Current Coin, Arrows in the Air, Ashes to Ashes* (favoring cremation), *American Humorists* (1883), *Unsectarian Family Prayers, Christ and Christianity,* 5 vols. (incomplete 1889); *The Broad Church* (1891); *Travel and Talk* (1897); *Old Violins* (1898); etc.

HAWFINCH (*Coccothraustes vulgaris*): bird of the Grosbeak (q.v.) genus, and the finch family (*Fringillidæ*). It is considerably larger than the chaffinch; the adult male has the crown and back chestnut brown, neck, and rump gray, wings partly black, larger wing-coverts white. The hawfinch is very shy, avoiding man, and therefore often unobserved in districts where it is not rare. It is gregarious. It lives chiefly in forests, builds its nest on the highest branches of trees, and feeds much on the kernels of the haw (whence its name), on beechmast and the kernels of the plum, cherry, etc. It is widely diffused over Europe, in n. Africa, and temperate parts of Asia.

HAWICK, *haw'ĭk* or *haw'wĭk:* burgh of barony, and manufacturing town in s. Scotland, county of Roxburgh, at the confluence of the Teviot and the Slitrig, 10 m. s.w. of Jedburgh, 53 m. s.e. of Edinburgh by railway. Some of the churches and bank-offices are elegant modern buildings; many elegant mansions and fine villas have sprung up within recent years. The town contains relics of antiquity: among these are the Tower Inn, part of which was an ancient fortress, and the residence of the barons of the Drumlanrig, the superiors of the town; and the Moat, a circular mound, supposed to have been used in remote times both as the place of assembly and deliberation of the neighboring chiefs, and as the seat of justice. Hawick carries on the manufacture of Tweeds (q.v.) on a great scale, and has long been known as a principal seat of the hosiery manufacture in Scotland. The Tweed-trade has greatly increased in importance of late years, and, beside the manufacturers, resident wholesale merchants are largely engaged in it. The stocking manufacture was commenced 1780. Plaids, shawls, blankets, and leather are manufactured in the town. About 300 power and 100 hand-looms are employed. The exchange is a large and hand-

some building erected 1865. Hawick now forms one of the three border burghs, which together return a member to parliament. Hawick's municipal charter dates from 1537. Pop. 17,300.

HAWK, v. *hawk* [W. *hochi*, to clear the throat; *hoch*, the throwing up of phlegm: Magyar, *hak*, clearing the throat, phlegm: Dan. *harke*, to hawk: an imitative word]: to bring up phlegm by coughing. HAWK'ING, imp.: N. the effort to force up phlegm from the throat; a small cough. HAWKED, pp. *hāwkt*.

HAWK, v. *hawk* [Norw. *hauka*, to cry, to shout: Pol. *huk*, roar, din: W. *hwa*, to halloo: Dan. *hökre*, to hawk: Ger. *höken*, to higgle, to huxter]: to carry about goods for sale from place to place; to peddle. HAWK'ING, imp.: N. the act of offering goods for sale on the streets. HAWKED, pp. *hawkt:* see HAWKER.

HAWK, n. *hawk:* a small flat board, having a handle underneath, used by plasterers when at work with mortar or plaster; probably connected with HAWK 5.

HAWK, n. *hăwk* [AS. *hafoc:* Icel. *haukr*, a hawk: Fin. *hawikka*, a hawk—from *hawia*, voracious]: a bird of prey of several species: term often applied to almost all the *Falconidæ*, except the largest eagles, but used also in a restricted sense to designate a section of the family, reckoned among the *ignoble* birds of prey, having the wings so short as not to extend to the extremity of the tail, and the bill short and curving from the base. In many of their characters and habits, however, they make a very near approach to the true falcons. The species are numerous, are arranged in several genera, and are distributed over the world. Examples of two of the most important genera are the Goshawk (q.v.) and Sparrowhawk (q.v.), see also FALCONIDÆ. In *heraldry*, the hawk frequently occurs as a charge, and may be *belled*, *jessed*, and *varvelled*. The *hawk's bell*, itself used as a separate charge is attached to the leg of the bird by *jesses* or thongs of leather. *Varvels* are rings attached to the end of the jesses. The *hawk's lure*, also a heraldic charge, consists of two wings joined with a line, to the end of which is attached a ring. The line is sometimes *nowed* or knotted. HAWK, v. to fly trained hawks at birds on the wing. HAW'KING, imp.: N. the sport of taking wild birds by means of a hawk. HAWKED, pp. *hăwkt:* ADJ. crooked or curved, like a hawk's bill. HAWK-EYED, quick-sighted. HAWK-NOSED, *-nōsd*, having a nose crooked like the beak of a hawk.

HAWK, or HAUK, n. *hawk* [Icel. *hack*, a hook]: an instrument with bent prongs for dragging manure from the cart in the process of manuring a field: V. to drag manure from a cart in manuring a field.

HAWKE, *hawk*, EDWARD, Baron: 1705—1781, Oct. 17; b. England: admiral. He entered the navy when a boy, became commander of the *Wolf* 1733, took part in the naval battle off Toulon 1744, and distinguished himself by running his ship out of the line of battle and capturing a

Spanish vessel of superior force. For this breach of discipline he was tried and dismissed from the service; but George II. almost immediately restored him. In 1747, he was promoted rear-admiral, gained a signal victory over a French fleet convoying W. Indian merchantmen off Belleisle, and was created knight companion of the Bath. He was elected to parliament 1747, was promoted vice-admiral of the blue 1748, and admiral of the white 1755 succeeded Admiral Byng in command of the Mediterranean fleet 1756, drove a French fleet intended for America on shore on the Basque Roads 1758, and prevented a projected French invasion of England by defeating a large fleet in Quiberon Bay during a furious storm 1759. For this victory he received the thanks of the Commons and a pension of £2,000 per annum. He was appointed vice-admiral of Great Britain and first lord of the admiralty 1765, and raised to the peerage 1776.

HAWKER, n. *hawk'ĕr* [O.Dut. *heukeren*, to sell by retail: Dan. *hökr*, a huckster]: pedler, or petty chapman, or vender; a travelling seller of goods; a crier and retailer of goods or one who exercises his handicraft about the streets. *Note.*—This word may only be a corruption of HUCKSTER, properly the feminine form, which see. Skeat says HAWKER is a much older word than the verb HAWK 2. Laws relative to this occupation vary in different localities; but generally, a hawker is required to have a license, which he can obtain on payment of a certain sum; and the business is held under somewhat strict police regulation. This is not only because of liabilities to fraud, but also for the protection of regular shopkeepers from being undersold by a class of venders who pay no rent.

HAWKER, n. *hawk'ĕr* [Dut. *hoeker*]: vessel built like a pink, but rigged like a hoy; that is, having a narrow stern and sloop-rigged.

HAWKESBURY, *hawks'bĕr-rĭ*, Canada, village in Prescott county, Ontario; on the Ottawa river, and a terminus of a branch of the Canada Atlantic railway, 50 m. w. of Montreal. It has ferry communication with Grenville, across the river. Its chief industrial establishments are flour mills, a woolen factory, and large saw and planing mills. It has an extensive lumber trade. Pop. (1901) 4,150.

HAWKESBURY, river of New S. Wales, enters the Pacific at Broken Bay, about 20 m. n. of Sydney; length, 330 miles.

HAW'KINS, *hawk'ĭnz*, ANTHONY HOPE, English novelist, known by the pen-name ANTHONY HOPE; b. London 1863, Feb. 9. He was educated at Balliol College, Oxford, was admitted to the bar at the Middle Temple in 1887, and practised until 1894 on the London and Midland circuit. He contested South Bucks as a Liberal in 1892, but unsuccessfully. In 1894 he achieved a striking literary success with his *Prisoner of Zenda*, with scene in an imaginary independent state of South Germany. Other books of his

are: *The Dolly Dialogues* (1894), cited as models of keen if somewhat shallow repartee; *The Chronicles of Count Antonio* (1895); *Rupert of Hentzau* (1898): *The Intrusions of Peggy* (1902); *The King's Mirror; Quisanté; Tristan of Blent; Double Harness; A Servant of the Public;* etc.

HAWKINS, Benjamin: 1754, Aug. 15—1816, June 16; b. Warren co., N. C. He left Princeton College in his senior year and joined Washington's army; was on his staff over a year; 1780 made commercial agt. of N. C.; 1781–84 member of continental congress; 1785 was appointed on a commission to treat with Cherokee and other Indians, and afterwards to negotiate with Creek Indians; 1786–7 again in congress; 1789 was elected by legislature one of the first two senators from N. C., taking his seat 1790. Before the close of his term he was appointed by Washington agent for all Indian tribes south. In a short time he gained the confidence of the Indians and complete control over the four principal Indian nations of the United States. He was 36 years in the public service.

HAWKINS, Hamilton Smith, American military officer: b. South Carolina 1834. He entered the army in 1861, was made captain in the 6th infantry in 1863, and brevetted major in 1865, October. In 1888 he became commandant at West Point, and in 1894 was promoted colonel. When war was declared against Spain (1898) he went to the front as a brigadier-general of volunteers. He led the desperate and now historic charge at San Juan, Cuba, 1898, July 2, was made major-general of volunteers, 1898, July 8; brigadier-general in the regular army, 1898, Sep. 28; and was retired 1898, Oct.

HAWKINS, Sir John: abt. 1532–1595, Nov. 12; b. Plymouth: English navigator. He has the infamous distinction of being the first Englishman that trafficked in slaves. His 'commercial' career ended 1568, after which he was more honorably employed. He was appointed treasurer of the navy 1573, knighted for his services against the Spanish Armada 1588 and for the rest of his life was engaged in making havoc of the Spanish W. Indian trade. In 1595, with his kinsman, Drake, he commanded an expedition against the Spanish settlements in that part of the world, but died in the same year. Hawkins founded a hospital at Chatham for relief of disabled and sick sailors.

HAWK-MOTH: name sometimes used to comprise all the lepidopterous insects of the section *Crepuscularia*, the Linnæan genus *Sphinx*. They have a spine or stiff bristle, on the anterior edge of each of the hind-wings, and these being received in corresponding hooks on the under-side of the fore-wings, attach them together. Their wings are generally covered with a looser down than those of butterflies. The body is rather large and thick. Notwithstanding the name *Crepuscularia*, signifying that their period of activity is that of twilight, and which is truly characteristic of the greater number, many of them may be seen darting from flower to flower even at mid-day, or hovering over

flowers, from which they suck the honey by their long proboscis. They make a loud, humming noise with their wings, and are insects of very rapid and powerful flight. Their caterpillars have always 16 feet. A peculiar position which the caterpillars often assume has led to the name *Sphinx*, because of a fancied resemblance to the sculptured monster of Egypt. Their chrysalids are cylindrical, free from points and angular prominences, blunt-headed, with a conical abdomen and are sometimes inclosed in cocoons, sometimes concealed in the earth.—The name hawk-moth is sometimes limited to a division of the *Crepuscularia*, of which the genus *Sphinx*, as now restricted, is the type, and of which the Death's Head Moth (q.v.) is an example. Their caterpillars are smooth and elongated. The name hawk-moth appears to be derived from the hovering motions of these insects, resembling those of hawks looking for prey. Hawk-moths are most abundant in warm climates: some species have a wide geographical range.

HAWKS, *hawkz*, Francis Lister, d.d., ll.d.: 1798, June 10—1866, Sep. 27; b. Newbern, N. C. He was educated at the Univ. of North Carolina; admitted to the bar 1817: in 1819, elected to the state legislature; but being drawn to the clerical profession, he was ordained, 1827, a clergyman of the Protestant Episcopal Church; and was rector at New Haven, Philadelphia, and St. Thomas's Church in New York, until 1843. During this period he was appointed historiographer of the Protestant Episcopal Church in America, and visited England in search of documents. In 1837, he founded, with Dr. Henry, the *New York Review*, and established St. Thomas's Hall, a high school, at Flushing, Long Island, which involved him in heavy pecuniary liabilities, charges based upon which were brought against him on his election 1843 as Bishop of Mississippi. He was acquitted of the charges, but declined the bishopric. In 1844, he became rector of Christ's Church, in New Orleans, and pres. of the University of Louisiana. In 1849, he declined the bishopric of Rhode Island, and became rector of Calvary Church, New York. In his busy career he published *Reports of the Supreme Court of North Carolina* (4 vols., 1823–28), *Contributions to the Ecclesiastical History of the United States* (2 vols., 1836–40), *Egypt and its Monuments* (1849), *Auricular Confession in the Protestant Episcopal Church* (1850), a translation of Rovero and Tschudi's *Antiquities of Peru* (1854), and edited the papers of General Alexander Hamilton, biographical works, several juvenile books, *Commodore Perry's Expedition to the China Seas and Japan in* 1852–54, and a portion of a *History of North Carolina*.

HAWKSBEE (or Hauksbee), *hawks'bē*, Francis: English natural philosopher: born in the latter half of the 17th c.; died about 1730. He was admitted a fellow of the Royal Soc. in 1705, and was appointed curator of experiments to the soc., and in 1723, assistant secretary. He contributed 43 memoirs to the *Philosophical Transactions*, 1704–13, chiefly on chemistry and electricity. Of his

experiments in electricity, Dr. Thomas, historian of the Royal Soc., observes, that 'they constitute the beginning of the science, and were doubtless of particular service in promoting electrical investigations.' He improved the earlier air-pumps of Boyle, Papin, and Hooke, and was the first who used glass in the electrical machine,

HAWK'SHAW, Sir JOHN: engineer: b. Leeds, England, 1811; d. 1891, June 2. He received a grammar-school education, was asst. to Alexander Nimmo, engineer in charge of the construction of public works in Ireland; and succeeded him in the management of the Bolivar copper-mines in S. America 1831. He returned to England 1834, and was engaged on numerous great engineering works in various parts of Europe till 1874, when he accepted a commission from the emperor of Brazil to examine and report on the principal harbors on that coast. He was president of the Institution of Civil Engineers 1862–3, was knighted 1873, and was president of the British Assoc. at the Bristol meeting 1875. His professional work includes the construction of railroads in England, Russia, India, and Mauritius, bridges and docks in Hull and London, foundation for the forts at Spithead, great ship canal from Amsterdam to the North Sea, and the improvement of the great sluice at St. Germaines after the disaster 1862.

HAWK'WEED (*Hieracium*): genus of plants of nat. ord. *Compositæ*, sub-ord. *Cichoraceæ*. The species are annual, or more generally perennial plants, some with leafless scapes, one flowered or many-flowered, and some with leafy stems; the leaves, stems, and involucres in many species being hairy. They are very numerous, natives of the temperate and colder regions of the northern hemisphere, abounding particularly in Europe. The flowers are generally yellow, but the Orange hawkweed (*H. aurantiacum*), native of s. Europe, is often cultivated in gardens for its rich orange flowers. It is a perennial, about two ft. high.

HAW'LEY, *haw'lĭ*, GIDEON, American missionary to the Indians: b. Stratfield, now Bridgeport, Conn., 1727, Nov. 5; d. Marshpee, Mass., 1807, Oct. 3. He was graduated at Yale College in 1749, and commenced his labors at Stockbridge in 1752, opening a school at that place, in which he instructed a number of Mohawk, Oneida, and Tuscarora families. In 1754, under the patronage of Sir William Johnson, he began a mission among the Iroquois, or Six Nations, on the Susquehanna river; but in 1756 was obliged by the disturbances of the French war to leave that region, when he became a chaplain in the army marching against Crown Point. The campaign being over, he re-engaged in his missionary work at Marshpee, where he was installed as pastor in 1758, and there passed the remainder of his life in his benevolent labors.

HAWLEY, JOSEPH, American statesman: b. Northampton, Mass., 1724; d. 1788, March 10. He was graduated at Yale College, and followed the profession of law at

Northampton, in which he rose to eminence. At the time of the disputes between Great Britain and America, he took a prominent part in advocating the cause of the colonies. 'We must fight,' he wrote to the delegates of Massachusetts, 'if we cannot otherwise rid ourselves of British taxation. The form of government enacted for us by the British parliament is evil against right, utterly intolerable to every man, who has any idea or feeling of right or liberty.' He was several times elected a member of the council, but declined, preferring to enter the State legislature, of which he was a member 1764–6.

HAW'LEY, Joseph Roswell, LL.D.: journalist: b. Stewartsville, N. C., 1826, Oct. 31; d. Washington, D. C., 1905, March 17. He graduated at Hamilton College, 1847, studied law and began to practice in Hartford, 1850, aided in organizing the republican party in Conn., 1856, abandoned law for journalism, 1857, and was editor of the Hartford *Evening News*, an organ of the new party, till 1861, Apr. 15, when he was the first man in Conn. to enroll his name as a voluunteer. He was appointed lieut. and afterward capt. in the 1st Conn. inf., was in the battle of Bull Run, and at the close of his 3 months' service, aided in recruiting the 7th Conn. inf., of which he was commissioned lieut.col. In 1862, he was promoted col., 1863, placed in command of a brigade, 1864, promoted brig.gen., 1865, brevetted maj.gen., and 1866, Jan., mustered out of the service. After serving a term as gov. of Conn,.1866–7, he became editor of the Hartford *Courant*, with which the *Press* had been consolidated, 1867; pres. of the national republican convention, 1868; member of congress, 1873–76, 1879–81; U. S. senator, 1881–1905. He was pres. of the U. S. Centennial Commission, 1872-77, and received the degree LL.D. from Hamilton College, 1875, and Yale Univ. 1886.

HAWSE, n. *hăwz*, also Halse, n. *hăwz* [It. *alzare;* OF, *hausser*, to raise: Dut. and Icel. *hals*, the neck part of the bow of a ship, or of a sail—in Scot. *hawse* means the throat]: the situation of a ship's cables when she is moored with two anchors out forward, one on the starboard, one on the port bow—a *foul hawse* being when the cables cross each other or are twisted together: also the part of the bows close to the cables: also any small distance ahead of a ship, or between her bow and the anchors at which she rides; e.g., when it is said of another vessel 'she sailed athwart our hawse,' or 'she anchors in our hawse.' When the two cables pass directly to their anchors, without crossing or chafing at the *hawse-holes* by which they enter the ship, the vessel is said to have a 'clean hawse.' Hawses, n. plu. *hăwz'ĕz*, or Hawse-holes, the holes in the bow of a ship through which cables are passed. Haws'er, n. *-ẽr*, or Halser, n. *hăwz'ẽr* a small cable or large towing-line. See Rope.

HAW'THORN [see Haw], (*Cratægus oxyacantha;* see Cratægus): shrub or small tree, native of Europe, Siberia,

and n. Africa, common in Britain, and much planted for hedges and for ornament. It varies in height from 6 or 8 to 20 or 25 ft. It has roundish obovate 3-5 lobed deciduous leaves, and corymbs, generally of white, rose-colored, or sometimes deep crimson flowers, succeeded by a small red fruit (*haws*) with yellow pulp, the central stony part bearing a very large proportion to the pulp. The fruit remains on the tree after the leaves have fallen, and affords winter-food to birds. There are many varieties of hawthorn, some having only one style, whilst some have several. The variety called GLADSTONBURY THORN—because supposed to have originated at Glastonbury Abbey— is remarkable for its early flowering, often in the middle of winter; though the common kind is not in flower till May or June. The winter flowers of the Glastonbury variety are, however, not generally followed by fruit, and a second flowering often takes place in the same year. The common hawthorn is often popularly called *May*, from the season of its flowering in England. It is also called *Whitethorn*, in distinction from the Sloe or Blackthorn. The use of the hawthorn for hedges is almost universal in Britain. It is sometimes employed as a stock on which to graft apples and other *Pomaceæ*. It attains a great age, and in its more advanced stages, is a tree of slow growth, though, when young, it shoots up rapidly. The wood is very hard, close-grained, and takes a fine polish, but is apt to warp. A fermented liquor, very intoxicating, is made from the fruit in many parts of France.

The hawthorn is valuable as a hedge plant, by reason of its strong and plentiful spines, its long life, and its ready adaption to very various soils. For this purpose it is propagated by seed; the haws are laid in a heap to rot, with a mixture of sand or fine mold, and in a year or sixteen months afterward the seeds are sown in ground carefully prepared. The young plants are kept clear of weeds, and often grow to the height of a foot or two ft. in the first season. (See HEDGE.) Hawthorn hedges bear trimming very well. Young hawthorn plants are called *quicks* or *quicksets*, becaused used to make living (*quick*) fences.

HAWTHORNE, *haw'thawrn*, JULIAN: author: b. Boston, 1846, June 22; son of Nathaniel Hawthorne. He was a student in Harvard Univ. 1863–4, Harvard Scientific School 1867–8, and the Dresden Polytechnic Schools 1868–9, returned to the United States 1870, and was on the staff of the hydographic engineers in the New York Dock Dept. till 1872, when he went to Europe, whence he returned to New York 1882. His publications include *Bressant* (1873), *Idolatry* (1874), *Saxon Studies* (1875), *Garth* (1877), *The Laughing Mill, Archibald Malmaison, Ellice Quentin, Prince Saroni's Wife, Yellow Cap, Sebastian Strome* (1880), *Fortune's Fool* (1883), *Dust and Noble Blood* (1884), biography of *Nathaniel Hawthorne and His Wife* (1885), *John Parmelee's Curse*, and *Confessions and Criticisms* (1886), a series of detective stories founded on narratives by

Inspector Byrnes including *A Tragic Mystery* and *The Great Bank Robbery* (1887–89); and *Another's Crime* (1889); *American Literature; The Trial of Gideon; David Poindexter's Disappearance; A Dream and a Forgetting; Confessions and Criticisms; History of the United States from the Landing of Columbus to the Signing of the Peace Protocol with Spain* (1899); *Hawthorne Reading; Hawthorne and His Circle* (1903); etc.

HAW'THORNE, NATHANIEL: 1804, July 4—1864, May 18; b. Salem, Mass.: author. He passed his early youth on a farm at Raymond, Me.; in consequence of feeble health, returned to Salem 1819, and graduated at Bowdoin College in the class with Henry W. Longfellow, George B. Cheever, John S. C. Abbott, and Horatio Bridge 1825. While at college he contributed tales and verse to local periodicals, and after graduating applied himself closely to literary work. His first romance, *Fanshawe*, was published anonymously at his own expense 1826, and was so unsuccessful that he suppressed it. Soon afterward he completed *Seven Tales of My Native Land*, but vexed at the publisher's delay burned the manuscript. He then contributed essays, short stories, and sketches to the Salem *Gazette* and the *New England Magazine*, and had four of his *Twice-told Tales* published in the Boston *Token and Atlantic Souvenir* 1831, May. In 1836 he became editor of *The American Magazine of Useful and Entertaining Knowledge*, 1837 issued in book-form his *Twice-told Tales*, 1838 became a contributor to the *Democratic Review*, and 1839 was appointed weigher and gauger in the Boston custom-house. He lost his office on the accession to power of the whigs 1841, resumed literary work, published the same year an instalment of *Grandfather's Chair*, and became a member of the Brook Farm Community, with which he remained about a year. In 1842, July, he married Sophia Peabody, and settled in the old parsonage at Concord, Mass., which had been occupied by the Rev. William Emerson and his grandson, Ralph Waldo Emerson. In this quiet retreat he worked with great assiduity, seeing few visitors except Emerson, Thoreau, Channing, and Margaret Fuller; contributed to the *Democratic Review* the stories *Celestial Railroad, The Procession of Life, Fire Worship, Buds and Bird Voices*, and *Roger Malvin's Burial* 1843 and *Rappaccini's Daughter* 1844; and published a second series of *Twice-told Tales* 1845. In 1846 appeared his *Mosses from an Old Manse*, another collection of tales; and the same year his financial pressure was relieved by his appointment to be surveyor of the port of Salem, to which place he had been compelled to remove. He held this office till 1850, and in the interval wrote *The Scarlet Letter*, in the introduction to which he presented a charming and humorous bit of autobiography. The picture of the old official, so old and so wedded to routine that he cannot be convinced that he has been removed from office, and still pursues the course of his former daily life, is most cleverly drawn. On leaving the surveyor's office he removed to

Lenox, Mass., and settled in 'the ugliest little old red farm house,' where he wrote *The House of Seven Gables* (1851), *The Blithedale Romance*, and *Life of Franklin Pierce* (1852). *The Scarlet Letter* was the longest of his stories, and the first really successful one; *The House of Seven Gables* fully justified popular expectation; and *The Blithedale Romance* attracted wide attention, though appealing to a higher mental plane. When his college friend, Franklin Pierce, became president of the United States, Hawthorne was remembered in one of the earliest appointments, that of U. S. consul at Liverpool, which he held 1853–57. He then spent three years traveling in England, France, Italy, and Switzerland, and gathering material which appeared in *English Note-Books, French, and Italian Note-Books, The Marble Faun* (1860), and *Our Old House* (1863). After his return to the United States (1860) he made his home in Concord, Mass. He died suddenly in his sleep at Plymouth, N. H., while on the way to the White Mountains with ex-President Pierce. An instalment of *The Dolliver Romance* was published in the *Atlantic Monthly* in the July following his death; his series of *Note-Books* appeared 1868–72, *Septimus Felton, or the Elixir of Life* (found among his papers) 1872, and an incomplete sketch, *Dr. Grimshaw's Secret* (edited by Julian Hawthorne) 1882. A complete edition of his works was published in 12 vols. (Boston, 1883), and his biography has been written by George Parsons Lathrop (1876), Henry James (in the *English Men of Letters* series, 1880), James Russell Lowell (1885), and his son Julian Hawthorne (1885). Consult also Moncure D. Conway (*Great Writers' Series*); *Memorials of Hawthorne*, by Rose Hawthorne Lathrop; G. W. Curtis, *Literary and Social Studies;* T. W. Higginson, *Short Studies of American Authors;* Leslie Stephen, *Hours in a Library;* W. D. Howells, *My Literary Passion;* J. T. Fields, *Yesterdays With Authors;* R. H. Hutton, *Essays in Literary Criticism.* His wife Sophia Peabody Hawthorne (1810–71), was a woman of high culture, and poetic and artistic tastes. She illustrated a number of his early tales, and after his death edited his *Note Books*, and published a vol. of her own *Notes in England and Italy* (1868).

HAWTREY, Charles Henry, English actor: playwright and manager; b. Eton, 1858, son of Rev. John Hawtrey. He was educated at Rugby and Oxford, becoming an actor when he was twenty-three years old. His greatest success was in *The Private Secretary*, adapted from Von Moser's *Der Bibliothekar*, first produced in Cambridge in 1883, and played 844 consecutive times. Other plays in which he has been unusually successful are *Jane, Mr. Martin, A Message from Mars*, and *The Man from Blankley's*. With the last two plays he several times visited the United States. For several years he has controlled the Comedy and Avenue theatres in London.

HAXO-CASEMATE, n. *hăks'ō-* [from Baron *Haxo* (1774-1838), French gen. of engineers]: in *mil.*, a vault of masonry

inside the parapet, built as protection over a gun, but not over its embrasure, and open at the rear to the terreplain.

HAY, n. *hā* [Goth. *havi*, grass: AS. *heag;* Icel. *hey;* Dut. *hoy*, grass cut and dried]: cut grass dried and used for fodder. HAY-COCK, *hā'kŏk*, a conical pile or heap of hay in the field. HAY-RICK, *-rĭk*, hay raised in a pile or heap for preservation in the open air; also HAY-STACK. BOTTLE OF HAY, *bŏt'l* [F. *botte*, a bundle]: in *OE.*, a bundle of hay.

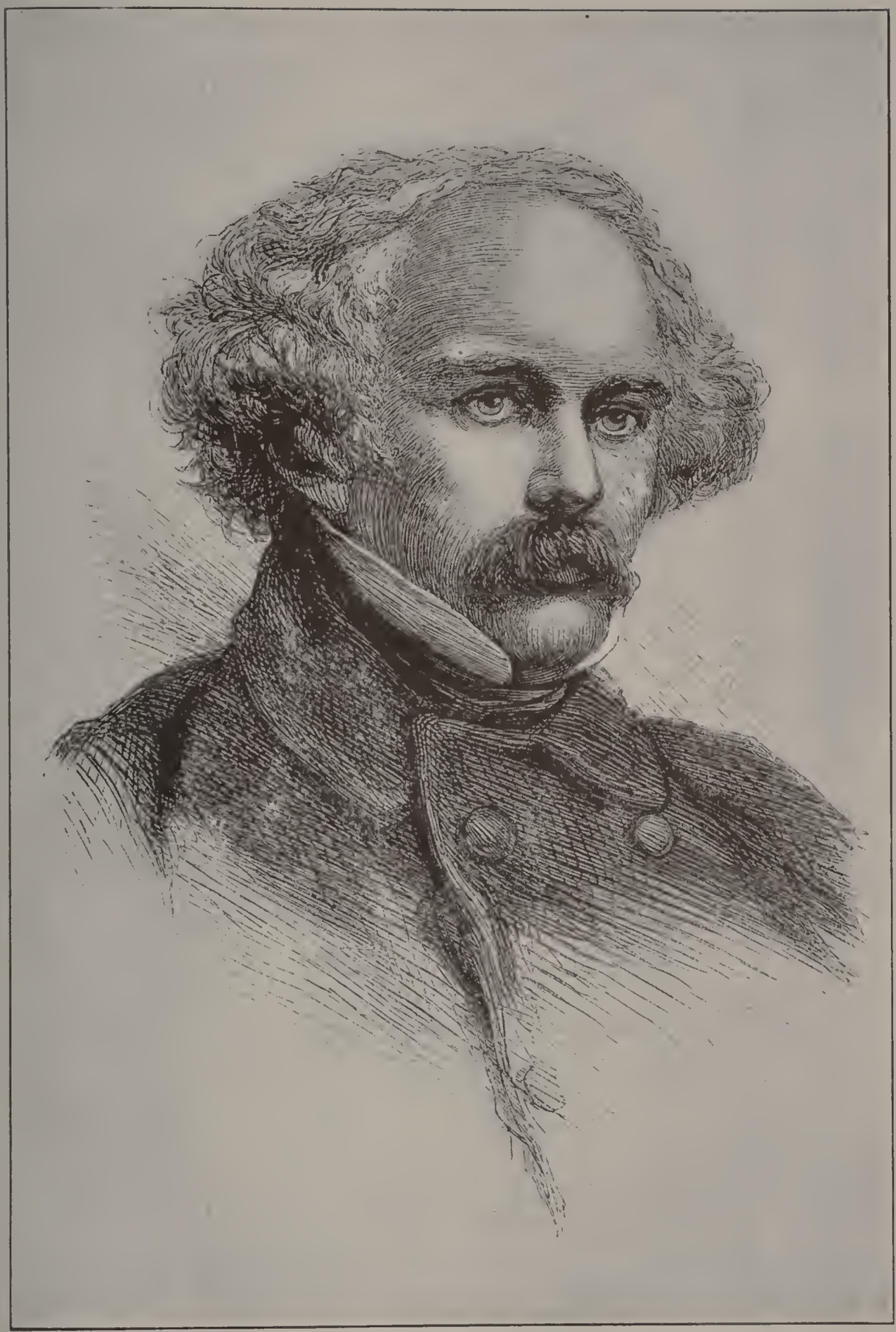
HAY: grass or other plants cut and cured for feeding to animals. Except in very warm regions hay is indispensable to the farmer. It is the principal crop in portions of the United States, and in the country at large is exceeded in value only by Indian corn. A large number of varieties of grass are grown for hay. The best are Timothy, Red-top (called Herd's-grass in the Middle and Southern States) Orchard grass, Fowl Meadow grass, and June grass. The latter is less valuable than the others, but succeeds in a large variety of soils and makes excellent pasturage. At the South, Meadow Oat grass is valuable for hay. Of the leguminous plants grown for hay, clover is by far the most useful and the most extensively cultivated. The cow pea is largely grown in the Southern States. Lucerne, or alfalfa, is grown successfully and profitably for hay on the Pacific coast and in portions of the South. Two or more varieties of grass are usually sown together and clover is frequently sown with grass. The cow pea and lucerne should be grown separately.

The seed from which the hay crop is to be produced is often sown with winter or spring grain, and does not yield a haryest until the second summer. If sown by itself, on good land which has been well prepared, early in autumn sowing should give a moderate crop the next year. Separate seeding is more expensive, but usually gives better results than sowing with grain. The land should be well plowed and the surface made extremely fine. A light dressing of fine and well-rotted manure, or of a suitable fertilizer, will be highly beneficial. An effort should be made to obtain grass seed free from that of weeds. Fresh seed is to be preferred, and plump seed should be secured if possible. The quantity to be used will depend upon the kind of grass to be grown. Moderately thick seeding will give a better quality and a larger quantity of hay than thinner sowing. The seed should be lightly covered with a bush harrow, and if the land is in suitable condition it may then be rolled.

The value of hay depends largely on the time at which the materials of which it is composed are cut. At certain stages of their growth plants are so imperfectly developed as to supply but little nutriment. At other stages changes have occurred which have greatly diminished the quantity of valuable elements. When grass stands too long, the starch, gum, and sugar which it contained are largely converted into a woody and comparatively indigestible fibre. If the seeds are allowed to mature

they abstract the nutritive matter from the stalks and leaves, and render them very poor for feeding purposes. Between the stages of incomplete development and the ripening of the seed is the period of blossoming. Numberless analyses and experiments have proved that at this time the plant is in the best possible condition to be cut for hay.

HAY, JOHN: U. S. secretary of state, diplomat, and author; b. Salem, Ind., 1838, Oct. 8; d. at 'The Fells,' Lake Sunapee, N. H., 1905, July 1. Hay received his elementary education in the public schools of his native town, among others at the old Eikosi Academy, and early showed promise of literary ability. He completed his studies at Brown University, Providence, R. I., graduating in 1858, and was the poet of his class, being also considered the finest writer the university had produced. He then studied law in the office of Abraham Lincoln, at Springfield, Ill., and was admitted a member of the Illinois bar 1861. On Lincoln's election to the White House, Hay became the President's asst. private sec., and except when performing staff duty during the civil war, with Gens. Hunter and Gilmore—for distinguished service being promoted col. and asst. adjt-gen.—he was almost constantly associated with Lincoln until the latter's death, 1865, Apr. 15. After the war he became sec. of legation at Paris, 1865–67, chargé d'affairs at Vienna, 1867–68, and sec. of legation at Madrid, 1869–70. He returned to the U. S. in 1870 and became an editorial writer on the N. Y. *Tribune* until 1876, achieving considerable reputation for the high quality of his literary work, especially *Castilian Days* (1871), descriptive of his stay in Spain, and his western dialectic poems, *Jim Bludso of the Prairie Belle*, and *Little Breeches*. In 1874 Hay married Clara, daughter of Amasa Stone of Cleveland, and through his marriage subsequently inherited a large fortune. In collaboration with John G. Nicolay, who had been Lincoln's private secretary when Hay was asst. sec., he undertook the writing of a *History of the Administration of Abraham Lincoln*, first published serially in *The Century Magazine* (1886–89), and in book form (10 vols., 1890), which ranks as the most authoritative and most complete biography of Lincoln. Hay had meanwhile re-entered public life as asst. sec. of state in the cabinet of President R. B. Hayes, under Mr. Evarts (1879–1881); and during Whitelaw Reid's absence in Europe assumed editorial charge of the *Tribune*, declining an offer of appointment as private secretary to President Garfield. When McKinley became president he recalled Hay to political life and gave him the important position of ambassador to England in 1897, where by word and deed Hay cemented more firmly the bonds of friendship between the two countries. Occasion arising for a statesman of experience and judgment with a knowledge of foreign affairs, President McKinley, in Aug., 1898, recalled Hay to take up the appointment of secre-



NATHANIEL HAWTHORNE.

tary of state in succession to William R. Day, who was proceeding to Paris as one of the U. S. Peace Commissioners of the Spanish-American War.

Hay's career hitherto had been marked by versatility and brilliance, but in the few short years that preceded his death his previous successes were totally eclipsed by the sagacious policy which made him the leading diplomat of his epoch, and if possible gained him a higher reputation abroad than at home. Called upon to serve his country at the period of its entry among nations as a new world-power, after the Spanish War, the various international problems that confronted him were solved with a straightforward, honest, and far-seeing policy, that made U. S. diplomacy an example of high principle, disinterested purpose, simple rectitude, and national integrity, earning for it the title, evoked from foreign admirers, of 'the new diplomacy.' Among his diplomatic triumphs were: the magnanimous protocol of peace arranged with Spain; the championship of the Philippine Commission; the independence of Cuba and the reciprocity treaty effected with the new republic; reciprocity treaties with England in connection with the British West Indies; reciprocity treaty with France; the settlement of the Alaskan boundary with Canada (see ALASKA); the abrogation of the Clayton-Bulwer treaty (q.v.), with Great Britain in favor of the Hay-Pauncefote treaty (q.v.), which assured the construction of a transisthmian canal by the U. S. govt.; and the suspension of the Venezuelan blockade by persuading the powers interested to refer the question of indemnities to the Hague tribunal (q.v.). His greatest victory, however, was when opposed to the ambition of avarice, and the selfish greed of nations, he formulated the policy of the 'open door,' the 'integrity of the Chinese Empire,' and secured the assurances of the powers to its maintenance.

HAYDEN, *hā'dn*, FERDINAND VANDEVEER, M.D., PH. D. LL.D.: 1829, Sep. 7—1887, Dec. 22; b. Westfield, Mass.: geologist. He graduated at Oberlin College 1850, and the Albany (N. Y.) Medical College 1853, immediately began exploring the Dakota 'bad lands,' spent 1854–56 exploring the basin of the upper Mo. river, was appointed geologist to a topographical expedition to the n.w. 1858, and naturalist and surgeon to an expedition for the exploration of the Yellowstone and Mo. rivers 1859. He was in the medical dept. of the Union army 1862, May—1865, May, prof. of mineralogy and geology in the Univ. of Penn. 1865–72, and director of U. S. geological surveys in Neb., Dak., Wyo., Utah, Colo., and Mont. 1867–86. His reports on the famous Yellowstone region (1870–71) led the federal govt. to create the Yellowstone National Park. Besides his annual reports which are profusely and richly illustrated, he was author of a large number of memoirs and monographs. He was a member of the principal scientific societies of the United States and Europe, and received the degree LL.D. from the Univ. of Penn. 1887.

HAYDENITE, n. *hā'dĕn'īt* [named after Dr. *Hayden*, of Baltimore]: variety of Chabasite, occurring near Baltimore.

HAYDN, *hā'dn*, Joseph, German composer: 1732, Mar. 31—1809, May 31; b. at the village of Rohrau, on the confines of Hungary and Austria; son of a poor wheelwright; showing great musical talent, he was received, at the age of eight, into the choir of the cathedral of St. Stephen's, at Vienna. Here he remained till his 16th year, acquiring a practical rather than a theoretical knowledge of his art, by singing the music of the best Italian and German religious composers. In that year his voice broke, and he lost his place as a chorister. He gave lessons in Vienna, played in the orchestra, occupied himself with composition, and thus earned a maintenance. At the same time, he studied with extreme care the first six sonatas of Emanuel Bach, which had accidentally fallen into his hands. His position, however, continued very critical, and he was on the verge of starvation when he had the good fortune to obtain as a pupil a little girl, Signora Martinez, who was being educated at Vienna under the care of the poet Metastasio. Haydn embraced this opportunity of making himself acquainted with the Italian language. Subsequently, Metastasio introduced him to the celebrated singer Porpora, who employed him to accompany him on the piano during his singing lessons, and from whom he obtained the instruction in composition that he so anxiously desired. In the latter part of 1750, he composed his first quartet for stringed instruments, and from this period his prospects rapidly brightened. In 1759, a certain Count Morzin engaged him as a music director and composer, 'with a salary of 200 florins, free lodgings, and table with his secretaries and other officials.' About this time, Haydn married the daughter of a hairdresser, who had been kind to him in his days of penury: the marriage did not prove a happy one: 'It is nothing to her,' said Haydn near the close of his life; 'whether her husband be a cobbler or an artist.' Her ambition seemed to be to squander Haydn's earnings. In 1760, Prince Esterhazy placed him at the head of his private chapel. For him Haydn composed his beautiful symphonies (a style of composition in which he greatly excelled all his predecessors), and the greater number of his magnificent quartets. In the symphony known as *Haydn's Farewell*, one instrument after another becomes mute, and each musician, as soon as he has ceased to play, puts out his light, rolls up his music, and departs with his instrument. Pohl believes himself to have proved that the Farewell was an expostulation not against dismissing the band, as is commonly said, but against sending away the wives and children of the musicians from Esterhazy. After the death of Prince Esterhazy, 1790, Haydn accompanied Salomon the violinist to England, where, 1791–2, he produced six of his *Twelve Grand Symphonies*. His reception was brilliant in the highest degree. In 1794, he made a second engagement with Salomon for England, and brought out the remaining six symphonies. In England first he obtained that recog-

nition which he gained later in his own country. On his return to Austria he purchased a small house with a garden in one of the suburbs of Vienna. Here he composed his oratorios, the *Creation* and the *Seasons*. The former work, the harmonies of which are pervaded with the fire of youth, was written in his 65th year, and is considered by many equal to the finest productions of Handel; the *Seasons* (completed in 11 months) was almost his last work. He died at Vienna.

Although Haydn composed slowly and very carefully, his works are exceedingly numerous, comprising 118 symphonies, 83 quartets, 24 trios, 19 operas, 5 oratorios, 163 pieces for the baritone, 24 concertos for different instruments, 15 masses, 10 smaller church-pieces, 44 sonatas for the pianoforte, with and without accompaniments; 12 German and Italian songs, 39 canzonets, 13 hymns in three and four parts, the harmony and accompaniment to 365 old Scottish songs, besides a prodigious number of divertissements and pieces for various instruments. Compare Griesinger, *Biographische Notizen über Haydn* (Leip. 1810); *Vie de Haydn* (Paris 1817); Grosser, *Biographische Notizen über Haydn* (Hirschb. 1826); *Pohl, Joseph Haydn* (Part I. 1875).

HAYDON, *hā'don*, Benjamin Robert: 1786, Jan. 26—1846, June 22; b. Plymouth: English painter. He exhibited his first picture at the Acad. 1807, *Joseph and Mary Resting with our Savior after a Day's Journey on the Road to Egypt*, which found a purchaser in the author of *Anastasius*. It was succeeded by *Dentatus*. Haydon quarrelled with the Acad. about the hanging of this picture, and his life thereafter was divided between painting and controversy. His pictures brought him admiration, and his wilful temper foes. His difficulties were increased through the stoppage by his father of an allowance of £200 a year. At this period, he had many patrons, and his pictures brought large prices; his *Judgment of Solomon*, for instance, 700 guineas. He made several attempts to be admitted an Associate of the Acad., and when he was refused, he characteristically imputed the refusal to the envy and jealousy of the academicians, and railed against them more bitterly than ever. He visited Paris with Wilkie, studied at the Louvre, and on his return, 1821, he married; and two years thereafter he produced the *Raising of Lazarus*, in some respects the most powerful of his works. His great work, *Christ's Entry into Jerusalem*, was exhibited by himself 1820, but its proposed purchase by the British Institution having fallen through, it afterward formed the nucleus for the American Gallery of Painting. Nothing daunted, Haydon painted other subjects. He became involved in pecuniary embarrassments, and was finally incarcerated in the King's Bench, from which, after a time, he was released through the assistance of his friends. While in prison he painted the *Mock Election*, which George IV. purchased for 500 guineas. *Napoleon Musing at St. Helena* excited great admiration. In 1836, he was again

imprisoned for debt, and was released on a settlement with his creditors. At this time he began a series of lectures on painting and design, which brought him fame and money When government determined to decorate the new Houses of Parliament with pictures Haydon engaged in the competition, and was unsuccessful. This defeat he never entirely recovered. He exhibited two of his latest productions 1846 at the Egyptian Hall, but the exhibition was coldly regarded by the public. This was the drop which made the cup overflow, and he put an end to his life by a pistol shot. See his *Life* by Tom Taylor (1852), and *Correspondence and Table Talk*, by his son (1876).

HAY'DUCKS. See HAJDUK.

HAYES, *hāz*, AUGUSTUS ALLEN: chemist: b. Windsor, Vermont, 1806, Feb. 28; d. Brookline, Mass., 1882, June 21. He was educated at the military acad. in his native town; studied chemistry under Prof. Dana of Dartmouth College; and 1825, distinguished himself by researches into the proximate elements of American medicinal plants, discovering the organic alkaloid Sanguinaria; and 1827, investigated the compounds of chromium. In 1828—having removed to Boston—in connection with the growing manufactories of New England, he devoted himself to the chemistry of commerce, of dyeing, and the manufacture of copper and iron. His numerous papers were published in the *Proceedings* of the Boston Soc. of Natural History, *American Journal of Science*, *Annual of Scientific Discovery*, etc. In 1837, his investigations into the generation of steam and economy of fuel, led to the construction of improved furnaces and boilers. He also discovered the process of reducing pig to malleable iron without loss by the use of the oxides of iron; new processes in copper smelting, the decomposition of alcohol, and formation of chloroform; and the oxidation of alcohol in the human system. As state assayer of Massachusetts, and in the employ of the Federal government, he made important investigations into the properties of guano; examined the constitution of sea-water at various depths, and its effects on the copper-sheathing of vessels; and by a series of useful studies and experiments added to the national wealth and the domain of science.

HAYES, ISAAC ISRAEL, M.D.: 1832, Mar. 5—1881, Dec. 17; b. Chester co., Penn.: explorer. He was educated to the medical profession, and appointed surgeon to the Arctic expedition under Dr. Kane, with which he returned to the United States 1855, convinced that there existed an open sea around the n. pole, and anxious to head an expedition for its exploration. In this project he was aided by Mr. Henry Grinnell, by the American Geographical and Statistical Soc., and by Sir R. I. Murchison and the Geographical Soc. of London. 1860, June, he fitted out a schooner of 133 tons, and sailed from New York; July 6, penetrated to 82° 45′ n. lat., making extensive explorations and observations of the coasts and their inhabitants, and

returned to Boston 1861, Oct. In 1868, he published *The Open Polar Sea, a Narrative of a Voyage of Discovery toward the North Pole, in the Schooner United States:* in recognition of which he was awarded a gold medal by the Royal Geographical Soc. of London, and a similar honor by the Geographical Soc. of Paris. In 1869 Hayes again visited Greenland, and explored its southern coasts.

HAYES, *haz*, RUTHERFORD BIRCHARD, LL.D., nineteenth President of the U. S.: 1822, Oct. 4—1893, Jan. 17; b. Delaware, Ohio. He received a common school education, attended the Norwalk Acad. Ohio. was prepared for college at Middletown, Conn., and graduated at Kenyon College, Ohio, 1842, and Harvard Law School 1845. He was admitted to practice in Ohio 1845, May 10, and established himself at Fremont 1845, and Cincinnati 1849. In 1856 he declined nomination for judge of the court of common pleas, 1858 was elected city solicitor to fill a vacancy, and 1859 was re-elected for a full term. He gave his adhesion to the republican party 1856, and worked earnestly for the success of its national ticket that year and 1860. In 1861, June, he was appointed by the governor major of the 22d Ohio volunteers, of which William S. Rosecranz was colonel, and Stanley Matthews lieutenant-colonel; was ordered to duty in West Virginia, and in September became judge-advocate of the department of Ohio. He was promoted lieutenant-colonel 1861, Oct. 15; commanded the regiment till 1862, December, led the charge and was wounded at the battle of South Mountain, was promoted colonel 1862, Oct. 24; was on sick leave a month, and soon after his return to the field was placed in command of the 1st brigade of the Kanawha division, which he retained till 1864, September, when he succeeded to the division command. During this period he led an expedition from s. w. Virginia to Ohio to check the Confederate raider Morgan; commanded a brigade in Crook's expedition to cut the Confederate lines of communication between Richmond and the s. w., led his brigade in storming the fortifications on the top of Cloyd mountain, was in the two battles at Winchester, and in the latter with 40 men captured a Confederate battery, distinguished himself in the pursuit of the Confederates under Early especally at Fisher's Hill, and for his gallantry at Cedar Creek was promoted brigadier-general. In 1864, August, he was nominated for representative in congress, and though he would not leave the field to make a personal canvass, was elected. He was brevetted major-general of volunteers 1865, March 13, resigned his commission June 1, and took his seat in congress December 4. In 1866 he was re-elected, but resigned the seat on being elected governor of Ohio 1867; in 1869 he was re-elected governor; 1872 was defeated for congress; and 1875 was elected governor a third time Through his congressional and gubernatorial services he had been an uncompromising advocate of honest money — coin against irredeemable paper; and shortly after his third inauguration as governor the Ohio republican state con-

vention passed a resolution to present his name to the national convention as a candidate for the presidential nomination (1876, March 29). The national convention assembled June 14 following. James G. Blaine, Benjamin H. Bristow, Oliver P. Morton, and Governor Hayes were the principal candidates before it; and the latter was nominated on the 7th ballot, receiving 384 votes, to 351 for Blaine, and 21 for Bristow. In his letter of acceptance he outlined the policy that he believed should be pursued, and particularly favored civil-service reform, resumption of specie payments, and pacification of the South. The national democratic convention nominated Governor Samuel J. Tilden of New York for the presidency, and the returns of the election showed a popular vote of 4,033,950 for the republican candidates and 4,284,855 for the democratic. But in the counting of the votes by the returning boards, especially in Florida, Louisiana and South Carolina, the republicans charged fraud upon the democrats. Both parties claimed the election, and partisan feeling reached fever-heat. In the emergency both parties agreed to the creation by congress of a special tribunal to canvass the returns thoroughly, and to declare who was legally elected. On 1877, March 2, the president pro tem. of the U. S. senate announced the republican candidates had received 185 electoral votes—a majority of one—and were elected. (For details and proceedings of this tribunal see ELECTORAL COMMISSION, PRESIDENTIAL). Immediately after his inauguration he put in execution his plans for settling the serious difficulties in the southern states with the result that the Nicholls government was recognized in Louisiana and the Hampton in South Carolina, and the U. S. troops were withdrawn from both capitals April 10, 20. As a further evidence of his policy of conciliation he called to his cabinet a prominent citizen of the South, who had been a Confederate officer and had opposed his election. After the adjustment of the political imbroglios in Louisiana and South Carolina, he turned his attention to the civil service, and (June 22) issued an order which recited that 'no officer should be required or permitted to take part in the management of political organizations, caucuses, conventions, or election campaigns,' and that 'no assessment for political purposes, on officers or subordinates, should be allowed.' His efforts to bring about a resumption of specie payments resulted in the accumulation by the treasury department of sufficient coin to offset the outstanding legal-tender notes and resumption was accomplished without friction 1897, Jan. 1. Through his entire administration congress seemed but little inclined to heed his recommendations, and even when the senate had a republican majority his work was greatly retarded and several times his hands were hopelessly tied, as in the failure to make necessary appropriations for the support of the army (1877), for the expenses of the government (1879), and the support of the civil service commission; the attaching of legislative riders to appropriation bills which resulted in their defeat.

RUTHERFORD B. HAYES.
Nineteenth President of the United States.

and the legislation to prohibit the employment of U. S. troops at elections. He courageously removed several very prominent office-holders for making the business of their offices subordinate to partisan activity, urged a vigorous enforcement of the anti-polygamy laws, appealed for civil-service reform in the line of competitive examinations, and endeavored to prevent the interference of congressmen in the civil service. During his term he sent 10 veto messages to congress, and the majority were sustained. After his retirement from office he resumed residence at Fremont, Ohio, he received the degree LL.D. from Kenyon College and Harvard, Yale, and Johns Hopkins Universities, and became president of the John F. Slater Educational Fund (for the Southern States), president of the National Prison Reform Association and trustee of a number of educational and benevolent institutions.

HAYESINE, n. *hā'ĕs-ĭn* [after *Hayes*]: borate of lime, known also as *Borocalcite*, *Hydroborocalcite*, *Tiza*, etc.: a mineralogical curiosity until 1851; now important in the arts. It is found in some parts of Peru in rounded nodules rarely larger than a good sized orange, imbedded in the soil. It is always associated with the nitrate of soda. Its chemical composition is $CaO.2B_2O_3+3H_2O$; or boracic oxide, 45.98; calcium oxide or lime 18.45; water, 35.57. It is used as a source of boracic acid in the manufacture of the borate of soda, extensively employed as a fluxing material for glazing pottery; in glass-making, metallic soldering, etc.: the only other known sources being the boracic acid from the Tuscan springs, and the borax and tincal from Tibet. See BORAX.

HAYESITE. See HAYESINE.

HAY-FEVER, or HAY-COLD, or HAY-ASTHMA; also ROSE-COLD, PEACH-COLD, AUTUMNAL-CATARRH: catarrhal affection of the nasal or bronchial passages or both, to which certain persons are annually subjected at periods indicated by the various names. It usually presents the symptoms of a severe cold in the head, accompanied by almost constant sneezing, running of the eyes, more or less coughing, and sometimes fever. At a later stage asthma, especially at night, becomes a most distressing symptom. The affliction is believed to be caused by pollen from some plants, acting upon certain peculiarly sensitive areas in the mucous membrane of the nostrils. Some persons suffer only in the haying season, others when the air is laden with the perfume of the rose, and others again when peaches have nearly ripened or are handled for preserving. That there is a strong neurotic element (not under the control of the patient's will, however) is shown by the fact that the symptoms often appear with great suddenness on the same day of the month in each year. The medicinal treatment of hay-fever is very unsatisfactory; the most that can be accomplished by this means is to maintain nutrition and keep up the patient's strength during the attack. Burning nitre-paper, etc. may mitigate the severity of the asthmatic symptoms. A

permanent cure has been obtained in certain cases by destructive cauterization of the sensitive areas of mucous membrane in the nose. In other cases relief has been secured by means of an antitoxic serum, called pollantin. Many persons escape their annual visitation by passing the susceptible season in certain immune regions, such as, in the eastern United States, the White Mountains, the Green Mountains, and the Adirondacks. Others, though not so many, escape at the sea-shore.

HAYGOOD, *hā'gŭd*, ATTICUS GREENE, D.D., LL.D.: Meth. Episc. clergyman: b. Watkinsville, Ga., 1839, Nov. 19; d. Oxford, Ga., 1896, Jan. 19 He graduated at Emory College, Ga., and entered the Meth. Episc. ministry 1859, was Sunday-school editor and sec. of the Meth. Episc. Church South 1870–75, pres. of Emory College 1876–90, editor of the Wesleyan *Christian Advocate* 1878–82, declined election as bp. 1882, became gen. agent of the John F. Slater Educational Fund for the Southern States 1885 and in 1890 became bishop of the Methodist Church South. His published works include a prize missionary essay *Go or Send* (1873), *Our Children* (1876), *Our Brother in Black* (1881), *Close the Saloons* (1882), *Speeches and Sermons* (1884), and an edition of *Sermons by Bishop George Foster Pierce* (1886). He received the degree D.D. from Emory College 1870, and LL.D. from Southwestern Univ., Tex., 1884.

HAY'MARKET SQUARE MASSACRE: the murder of several policemen in Chicago, 1886, May 4, by a bomb thrown by an anarchist. The labor troubles had long been exploited by the 'practical anarchists' (with whom the philosophic anarchists disclaim connection), who denounced the efforts for shorter hours and better wages as tending merely to aggravate capitalistic slavery, and urged, instead the general seizure of property and the murder of its owners. In February 1886 the McCormick Reaper Works had been closed on account of a demand for the expulsion of some non-union men, but had reopened. Meantime a great eight-hour strike had left some 50,000 unemployed workmen in the city, and in view of an almost certain conflict with the police, George Engel proposed at a meeting in Bohemian Hall on May 2, and the meeting indorsed, a plan to blow up the police stations, shoot the emerging police, cut the telegraph wires, fire buildings to engross the service of the fire department, and make a general jail delivery, that the prisoners might aid in a social revolution. The next day August Spies and others incited a meeting of the Lumber-shovers' Union, 16,000 or more, principally Germans and Bohemians, to assail the McCormick Works in order to furnish an opportunity for carrying out this plan, though the works had no connection with this union. The mob attacked the works with stones and revolvers, but were driven off. No one was fatally injured, but Spies immediately issued a circular headed 'Revenge!' asserting that six workingmen had been killed, and calling their brethren to arms. He also pub-

lished a fierce article in his paper, the *Arbeiter Zeitung*, repeating the falsehood, and declaring that there had been a 'massacre' to terrorize the workingmen, who should have had dynamite bombs instead of stones. In the evening a meeting was held at Greif's Hall, at which Engel's plan was adopted. Spies, Albert R. Parsons, Samuel Fielden, and Oscar W. Neebe spoke for a mass-meeting to further the plan above mentioned; at Adolf Fischer's suggestion it was fixed for next evening in Haymarket Square, that the dusk and room for a great crowd might furnish more confusion and better means of escape. Rudolph Schnaubelt wished to have all socialists in other cities notified, so that there might be a general revolution. The signal was to be 'Ruhe' (Peace), which was printed in next afternoon's *Arbeiter Zeitung*. Meantime Louis Lingg and others worked all day preparing bombs, of which the newspaper office was found to be an arsenal, along with firearms, and with a confederate carried a satchel of them to a place where others helped themselves. The air was full of rumors of intended violence, and the mayor (Carter Harrison, Sr.) ordered the police to mix with the meeting, and disperse it if incendiary language were used, and 176 were concentrated at the nearest station. Spies and Parsons spoke first, but the mayor was in the crowd, and they used mild language, till his suspicions were lulled and he left. Then Fielden began a frenzied and bloodthirsty harangue, calling for the 'extermination' of the capitalists. The crowd grew so wild that shortly after 10 the police in four divisions appeared and covered the street, and while Fielden was speaking, Capt. Ward ordered the crowd to disperse. Fielden called out 'We are peaceable' (curiously like 'Peace'), and a bomb was at once thrown into the midst of the police, which exploded and caused frightful carnage, killing or mortally wounding eight policemen and injuring a great number more. The mob instantly followed it up with a volley from rifles and revolvers, proving that they had been expecting the signal, but the police, with a nerve as fine as that of trained soldiers, at once rallied and charged the mob, dispersing it in disorder. Most of the leaders who had been urging destruction either did not attend or ran away. Of the police, besides those killed, 68 were wounded by shot or bombs, many maimed for life. Spies, Parsons, Fischer, Engel, Lingg, Fielden, Michael Schwab, and Neebe were arrested and tried as accessories before the fact: the first four were hanged, 1887, Nov. 11. Lingg shattered his jaw in prison with a bomb and died; Fielden and Schwab were sentenced to prison for life, and Neebe for 15 years. The last three were pardoned by Gov. Altgeld in 1893, many prominent men of Chicago and throughout the country having petitioned for their release on the ground that the evidence did not connect them with the actual throwing of the bomb, which was true, the evidence pointing strongly to Schnaubelt.

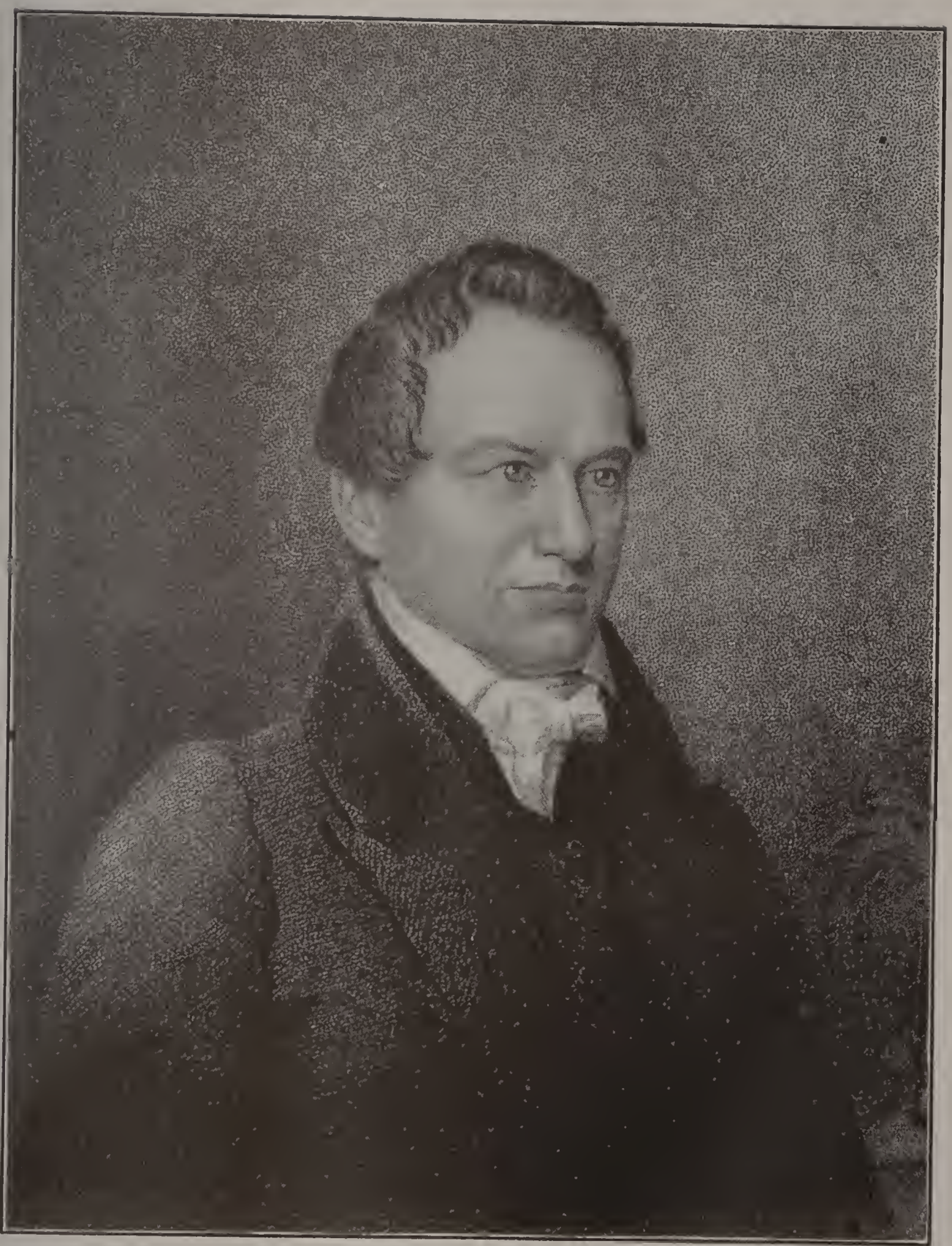
HAYNAU, *hī'now*, Julius Jakob, Baron von: 1786–1853, Mar. 14: Austrian general. He entered the Austrian

service 1801, and advanced in rank, till, 1844, he was appointed field-marshal. During the Italian campaigns 1848, 9, he signalized himself by his ruthless rigor, especially at the capture of Brescia. Haynau was engaged in the siege of Venice, when he was summoned by the emperor to Hungary, 1849, May, to take supreme command of the forces in that country. The storming of Raab, the advance southward, the occupation of Szegedin, and the engagements on the Theiss, all were the work of Haynau. But his atrocious severity toward the defeated Hungarians, and especially his alleged flogging of women (a charge denied by Haynau), excited the detestation of Europe. In 1850, he was dismissed from the public service, not for his cruelty, however, but for the intractability of his disposition. In the same year he was brought into unenviable notoriety on the occasion of his visit to the brewery of Messrs. Barclay and Perkins during his stay in London, when he was assaulted by the draymen, and barely escaped with life. For this insult the British govt. declined giving any satisfaction. Subsequently visiting Belgium and France, he was received by the populace with strong dislike, but by the vigilance of the authorities was preserved from actual insult. Baron Schönhals, in a biography of his friend Haynau (Grätz, 1853), tries to exonerate him from the accusation of being either constitutionally or intentionally cruel, and asserts that he only acted in obedience to the orders of his masters; this view has not found general acceptance. Haynau died at Vienna.

HAYNE, *hān*, Isaac: 1745, Sep. 23—1781, Aug. 4; b. S. C.: soldier. He was a planter and iron manufacturer in Beaufort co., S. C., at the beginning of the revolutionary war, became col. of a cav. regt., and was captured by the British and paroled 1780. In the following year he was ordered to join the British army in spite of the terms of his parole, but instead raised a regt. of local militia and again served in the patriot army. He was a second time taken prisoner, and without any trial was hanged.

HAYNE, Paul Hamilton: 1831, Jan. 1—1886, July 6; b. Charleston: poet. He graduated at the College of S. C., studied law and practiced sometime, became editor of *Russell's Magazine* and the Charleston *Literary Gazette*, gave up law for literature, was an aide on Gov. Pickens's staff (Confederate) in the early part of the war of secession, became impoverished by the war, and established himself in the pine-lands near Augusta, Ga. He was feeble from a child, and during his later years supported his family with his pen under distressing conditions. He has been called the poet laureate of the South. His published works include *Poems* (1855); *Sonnets and Other Poems* (1857); *Avolio, a Legend of the Island of Cos* (1859); *Legends and Lyrics* (1872); *The Mountain of the Lovers, and Other Poems* (1873); Lives of Robert T. Hayne and Hugh S. Legare (1878); and a complete edition of his poems (1882).

HAYNE, Robert Young, American statesman: b. Colleton District, S. C., 1791, Nov. 10; d. Asheville, N. C.,



ROBERT Y. HAYNE.

1839, Sep. 24. After studying law he was admitted to the bar in 1812; and served in the second war with Great Britain, returning at its close to his practice in Charleston. He was a member of the state legislature 1814–18, and became speaker, was attorney general of the state in 1818–22, and a United States senator 1823–32. He vigorously opposed protection, and in 1832 boldly supported in Congress the doctrine of nullification. Daniel Webster's reply to Hayne upon this theme is classed among the former's ablest speeches. In November 1832 South Carolina adopted an ordinance of nullification, in December Hayne was elected governor, and the state prepared to resist the federal power by force of arms. A compromise, however, was agreed to, and the ordinance was repealed. Hayne was mayor of Charleston in 1834.

HAYNES, *hānz*, ARTHUR EDWIN, American mathematician: b. Van Buren, N. Y., 1849, May 23. After graduation from Hillsdale College, Mich., in 1875 became instructor of mathematics and physics there in the same year; and was professor, 1877–90. He held the same position in Michigan Mining Schools in 1890–3, and was professor of mathematics at the University of Minnesota, 1893–6, and in its engineering department 1896–1901. He has published *The Desirability of Uniformity in the Use of Mathematical Symbols and Terms*, etc.

HAYNES, *hānz*, JOHN: d. 1654, Mar. 1; b. Copford Hall, Essex, England: statesman. He came to America with the Rev. Edward Hooker 1633, was appointed asst. gov. of Massachusetts bay colony 1634, and gov. 1635, removed to Conn. 1636, was chosen its first gov. 1639, and was re-elected every alternate year till his death. He was one of the committee of 5 who framed the first constitution of Conn. 1638, and was noted for ability, influence, and benevolence.

HAYNES, LEMUEL: 1753, July 18—1833, Sep. 28; b. W. Hartford: Congl. minister. He was a mulatto, brought up in domestic service, volunteered as a revolutionary soldier, joined the minute men 1775 and the expedition to Ticonderoga 1776, worked on a farm in Granville, educated himself, studied Greek and Latin with notable success, was approved as a candidate for the ministry 1780, supplied a Congl. church in Granville, and was ordained 1785. He preached at Torrington two years, Rutland 30 years, and Granville 11, and published a *Sermon against Universalism* (1805).

HAY-PAUNCEFOTE TREATY: signed 1901, Nov. 18 which replaces the Clayton-Bulwer treaty (q.v.) as an Anglo-American agreement of policy regarding an isthmian canal, then supposed to be fixed as across Nicaragua. It was drawn up by John Hay, secretary of state, and Sir Julian Pauncefote, ambassador from Great Britain. Public feeling for some years had been growing so sore over the Clayton-Bulwer treaty's restriction on the independent action of the United States, that there was

grave fear lest Congress might abrogate it by open violence, a great blow to future amicable action. President McKinley voiced the feeling by the declaration, in his annual message for 1898, that the canal had become a national necessity. Fresh negotiations were opened with Great Britain; that country had no wish beyond that of neutralizing the canal, and sent one of her best diplomats with very liberal instructions, to concede whatever did not nullify that essential principle. The draft treaty was sent to the Senate by the President 1900, Feb. 5. It provided that a canal might be constructed by the United States, or under its direction; should be permanently neutralized on the basis of the Suez Canal agreement—to be kept open at all times, either of war or peace, to all vessels, without discrimination, and no fortifications to be constructed commanding the canal or the waters adjacent, and that other powers should be invited to join in this guaranty of neutrality. The provisions excited intense hostility, and Senator Davis offered an amendment adopted by the committee on foreign affairs, canceling the very features for which it was drawn up, and which made the spirit of the previous one. It provided that the neutralization clause should not prevent the United States from any measures it thought needful for its own defense or the preservation of order, declared the Clayton-Bulwer treaty specifically abrogated, and struck out the third clause inviting the concurrence of other powers. In this form it was ratified by the Senate 1900, Dec. 20, but Great Britain refused to accept the transformed treaty, and it expired by limitation 1901, March 5. Undiscouraged, the two diplomats set to work on a compromise, which was signed by them 1901, Nov. 18, sent to the Senate by President Roosevelt, and ratified by them Dec. 16. The chief differences were in dropping as far as possible all specific guaranties, requirements, or prohibitions, leaving its interpretation and application to the chapter of fate and the certainty that the strong hand would decide in any event. The neutrality of the canal is not guaranteed at all except by the terms of the agreement, the Clayton-Bulwer treaty is abrogated by name, and the United States is not forbidden to construct fortifications, nor required to keep the canal open in time of war.

HAYS, *hāz*, ALEXANDER: 1819, July 8—1864, May 5; b. Franklin, Venango co., Penn.: soldier. He graduated at the U. S. Milit. Acad. 1844, July 1, served through the Mexican war, resigned from the army and engaged in the manufacture of iron 1848, studied civil engineering and practiced it 1854–61, was appointed col. 63d Penn. regt. and capt. 16th U. S. inf. 1861, May; promoted brig.gen. vols. 1862, Sep. 29; wounded at Chancellorsville, commanded 3d div. 2d corps after Hancock's fall at Gettysburg, brevetted col. U.S.A. and assigned to command defenses at Washington, and killed in the first day's battle of the Wilderness.

HAYS, Isaac, M.D.: 1796, July 5—1879, Apr. 13; b. Philadelphia: physician and editor. He graduated at the Univ. of Penn. 1816, and its medical dept. 1820; was editor of *The American Journal of Medical Sciences* 1827–69, founded *The Medical News*, 1843, and *The Monthly Abstract of Medical Science*, 1874, edited Wilson's *American Ornithology* (1828), Hoblyn's *Dictionary of Terms used in Medicine and the Collateral Sciences* (1846–55), Laurence's *Treatise on Diseases of the Eye* (1847),and Arnott's *Elements of Physics* (1848); prepared the *Code of Ethics* of the American Medical Assoc., and was pres. of the Acad. of Natural Sciences 1865–69, a founder and sec. of the Franklin Institute, member of the College of Physicians, and a founder of the American Medical Association.

HAYS, William: 1819–1875, Feb. 7; b. Richmond, Va.: soldier. He graduated at the U. S. Milit. Acad. 1840; entered the artill. branch of the army; was promoted 1st lieut. 1847, capt. 1853, maj. 1863; appointed brig.gen. of vols. 1862, Nov., and brevetted col. and brig.gen. U.S.A., at the close of the civil war. He served with the light artill. through the Mexican war, in the Indian wars in Fla. and Dak., commanded the brigade of horse-artill. in the Army of the Potomac 1862, and the reserve artill. at Antietam and Fredericksburg, was wounded and taken prisoner at Chancellorsville, provost-marshal-gen. of the dist. of N. Y. 1863, Nov.—1865, Feb., and commanded the reserve artill. before Petersburg and to the close of the war.

HAYS, William Shakespeare: balladist: b. Louisville, Ky., 1837, July 19; d. 1907, July 23 He received a collegiate education, was amanuensis to George D. Prentice, editor of the Louisville *Journal;* and for many years was an editorial writer on the *Journal*, *Democrat*, and *Courier-Journal*, of Louisville. In early boyhood he learned to play on various musical instruments without a teacher; published his first ballad, *The Little Ones at Home*, 1856, and his first ballad set to his own music, *Evangeline*, soon afterward. His songs had enormous sale in the United States and in England, and many of his melodies were used by Swiss, French, and Italian music-box manufacturers. His most popular ballads are *Nora O'Neal; Driven from Home; Mollie Darling; Wandering Refugee; Nobody's Darling; Write Me a Letter from Home; Shamus O'Brien; We Parted by the Riverside; Good-by, Old Home; Drummer Boy of Shilo; The Moon is out To-night, Love; Save One Bright Crown for Me;* etc.

HAYTI, *hā'tĭ*, or Haiti, or Santo Domingo, or Hispaniola: after Cuba, the largest of the W. India Islands; now divided into the independent states of Hayti, and the Dominican Republic (q.v.). It is nearly equidistant from Porto Rico on the e., and from Cuba and Jamaica on the w. with the Caribbean Sea on the s., and with the Bahamas and the open ocean on the n. Hayti is in n. lat. 17° 37′—20°, and in w. long. 68° 20′—74° 28′. It belongs to the group of the Greater Antilles, and, like all the principal members of its series, its greatest length (about 400 m.) is

in the direction—from w. to e.—of the chain of which it forms a part; its greatest breadth is 160 m.; area, including the islands of Tortuga, Gonaive, etc., about 28,000 sq. m.; Pop. (1901, est.) 1,294,400. The country, as the native name implies, is mountainous, traversed longitudinally by a ridge, which sends out lateral spurs terminating in headlands on either coast. Range is of volcanic origin—a fact still evinced by frequent earthquakes. Cibao, believed to be the loftiest summit, is said to be about 7,000 ft. above sea level. The mountains, richly and heavily timbered, are understood to be susceptible of cultivation almost to their tops. With such a soil well watered, and with a climate tempered by the sea-breezes, Hayti, as a whole, is perhaps the most fertile spot in the W. Indies; while its excellent harbors, more especially those in the Bay of Gonaives on the w., offer facilities to foreign trade—hurricanes, however, occurring in Aug. and Sep. The rivers are inconsiderable, and useless for navigation. Besides several bodies of fresh water, the salt lake of Henriquillo, near the s. shore, claims particular notice, as indicating by its tidal action some subterranean communication with the Caribbean Sea. The productions are coffee, logwood, mahogany, tobacco, cotton, cocoa, wax, ginger, sugar, hemp, and salt. Gold, silver, copper, iron, antimony, tin, coal, sulphur, kaolin, nickel, gypsum, limestone, and porphyry are found in commercial quantities, and some efforts have been made to work the copper deposits, while concession has been granted for mining coal, iron, and manganese. The forests are still unexplored but with the extension of the railroad system those districts will be opened up.

Within little more than an age after 1492, the aborigines has been swept away by the remorseless cruelties of the Spaniards. In connection with this deplorable result Hayti, already the seat of the first white settlement in America, became one of the earliest fields, in the w. hemisphere, of negro servitude. Next came the buccaneers, during the 17th c., unconsciously avenging the red men's wrongs; and as those marauders were chiefly French, the w. portion of the Island, their favorite haunt, was, 1697, ceded to France by the peace of Ryswick, thus presenting the first important break in the unity of Spanish America. For nearly 100 years, the intruders imported vast reinforcements of Africans; while the mulattoes, a natural incident of the concomitant license, rapidly grew, both socially and politically, into an intermediate caste, being at once uniformly excluded from citizenship and generally exempted from bondage. In 1791, under the influence of the French Revolution, the mutual antipathies of the three classes—white, black, and mixed—burst forth into what may well be characterized as the most vindictive struggle on record—a struggle which, before the close of the 18th c., led to the extermination of the once dominant Europeans, and the independence of the colored insurgents. Thus, as the emancipated bondmen mostly belonged, at least in form,

MAIN STREET, PORT-AU-PRINCE, HAYTI.

to the Church of Rome, Hayti now exhibited the only Christian community of negro blood on either side of the Atlantic. In 1801, France sent out a powerful armament to recover her revolted dependency, treacherously seizing and deporting the deliverer of his brethren, Toussaint l'Ouverture. In 1803, however, France was constrained to relinquish the attempt; and 1804, Dessalines (q.v.), aping Napoleon, proclaimed himself emperor of Hayti; thus reviving the indigenous name of the island, which had been in disuse more than 300 years.

This great change was fatal to the commercial prosperity of French Hayti, decidedly the more valuable section of the land. In its progress it had destroyed capital in every shape; and in its issue, it could not fail to paralyze labor under circumstances and in a climate where continuous exertion of any kind was equally irksome and superfluous. Nor was the political experience of the lately servile population more satisfactory than its economical condition. Sometimes consolidated into one state, and sometimes divided into two, the country alternated, through the instrumentality of one revolution after another, between despotism and anarchy, between monarchy and republicanism, between a kingdom and an empire. Its only tranquil period of any duration coincided with the rule of President Boyer, 1820 to 43—in the last 21 years comprising not merely the whole of French or Western Hayti, but also the Spanish or eastern portion of the island. Hayti thus united, besides being immediately recognized by the European powers in general, was soon acknowledged even by France, on condition of paying 150,000,000 francs, or nearly $30,000,000, compensation to the former planters.

About 1843, the inhabitants of the e. or Spanish portion of Hayti, rising against their Haytian oppressors, formed themselves into a republic called the Dominican Republic (q.v.), which 1861, May, threw itself under the protection of Spain, a connection which was dissolved 1865. The w. portion of the island had been republican in government previous to 1849, when its former president, Gen. Soulouque, proclaimed an empire, and ascended the throne as Emperor Faustin I. In 1859, however, a republic (*République de Haïti*) was again proclaimed and a new constitution adopted. The e., once Spanish, portion still exists as a separate republic, the *República Dominica*. Of the western portion (Haytian Republic), the area is more than 10,000 sq. m.; pop. abt. 550,000, of which nearly 500,000 are of African descent; the eastern (Dominican Republic) has an area of more than 18,000 sq. m.; pop. abt. 150,000, of which abt. 25,000 are of African descent. In the island there are of the mixed races, abt. 125,000 of Spanish, and abt. 50,000 of French descent.

Geffrard, who overthrew Soulouque in 1859, ruled until overthrown by Salnare in 1867, Nissage-Sagét succeeded 1874, Domingo 1876, and Salomon 1879. In 1888, on a general uprising, Pres. Salomon abdicated and left for France, where he died Oct. 10. On his departure a pro-

visional govt. was established. Gen. Telemaque, aspirant for the presidency, was killed in a riot in Port-au-Prince Sep. 28, and Gen. Légitime organized the govt., and was invested with supreme power. He immediately seized the treas. and war vessels, and assumed a dictatorship. Three depts. protested against his usurpations, and their representatives favored the election of Gen. Hyppolite to the presidency. Both generals took the field, both sides were well supplied with arms. In Oct. the American steamship *Haytien Republic* was seized and condemned on the charge of violating the blockade at Port-au-Prince. The U. S. govt. sent several naval vessels to Hayti to demand the surrender of the steamship, and she was turned over to Rear-Admiral Luce, Dec. France and England wholly, and Germany partially recognized Légitime; the United States declined to recognize either faction. Hippolyte continued successful in the main, and took possession of the capital, Légitime having previously agreed to leave the island . A new constitution was adopted Sep., and Hippolyte was unanimously elected pres. Oct. 27. An American syndicate agreed to furnish Hippolyte's govt. with $18,000,000 in return for a concession of all railroad, telegraph, mining, bridge-building, and banking privileges, and a certain amount of progress was made under Hippolyte's absolute administration until his death in 1896. Gen. Simon Sam became president until compelled to resign in May, 1902, when a state of civil war ensued between the provisional govt.under Boisrond-Canal and a party established at Gonaïves under M. Firmin. The latter was defeated, and in 1902, Dec., Gen. Nord Alexis was made president by the army.

Commerce, Industries, etc.—Practically all imports to Hayti come from the United States, England, France, and Germany in the order named. In 1906 the value of imports from the United States was $3,266,425 and exports $1,036,330. The total imports in 1905 were $3,871,069 and exports $8,967,862. The leading exports are coffee, cacao, logwood, cotton, and hides. The industries are chiefly agricultural, coffee, cacao, cotton, sugar, hemp and tobacco being the chief products. Cigars, cigarettes, soap, candles, watches, rum, pottery, artificial ice, etc., are the principal manufactures. A railroad runs from Cape Haitian to Grand Riviere and another is under construction to Port-au-Prince. Several other lines are projected or in course of construction. There are about 150 miles in operation. In 1905–6 the revenues were $4,278,860 and the expenditures $4,214,415. The total funded and unfunded debt in 1906 amounted to about $25,000,000.

Government, Education, etc.—Hayti is administered by a president, elected for seven years, by the House of Representatives and the Senate assembled in 'Assemblée Nationale.' The president is assisted by six ministers or secretaries of state. The House of Representatives is elected by the people for three years, and the Senate is

elected by the House of Representatives for six years; but every two years the third part of the Senate is renewed. The judiciary organization consists of a supreme court (Tribunal de Cassation) of civil, criminal, correctional courts, and of justices of the peace.

Public elementary education is compulsory and free in this republic, and there are 14 inspector's districts comprising 400 national schools, besides private schools and 5 public lycées. Nearly $1,000,000 are expended annually for public instruction, but illiteracy abounds, especially in the rural districts. French is the language of the republic, though a patois called 'creole' is spoken by the natives. The religion is Roman Catholicism, and in 1904 the govt. voted $400,000 to build cathedrals at Port-au-Prince and Cape Haiti. There are an archbishop, three bishops, and in every commune at least a priest. The pope entertains a diplomatic representative, a legate, at Port-au-Prince, and Haiti has a minister accredited to the Holy See. Freedom of conscience is, however, guaranteed; and all cults are protected. Haitian citizens only can own real estate. Any foreigner may easily be naturalized.

HAYWARD, n. *hā'wērd* [see HAW 1, and WARD]: in *OE.*, a parish or district bounded by *hays*, or *hedges;* the petty officer for the conservation of such inclosure; in *England*, one who keeps the common herd of cattle belonging to the tenants of a town or of a manor (in *Scot.* called 'shepherd'); a town officer in old New England, whose duty was to keep the cattle on the roads from breaking through the hedges or fences into enclosed grounds and to impound them if they did so. The title came to be generic for a cattle-ward, and the hog-reeve was frequently known as a 'hog howard.'

HAZ'ARA, or HUZARA, *hŭz'â-râ:* district of British India in the Punjab; bounded n. by the Black Mountains, Kohistan, and Chilas; e. by the native state of Kashmir; s. by the Rawal Pindi dist.; w. by the Indus river; lat. 33° 45′—35° 2′ n., long. 72° 35′ 30″—74° 9′ e.; 2,771 sq. m. It is a valley, with mountains on both sides, some of whose peaks are 17,000 ft. above the sea; is watered by the tributaries of the Indus, the Kunhar, and numerous small streams; is picturesque in scenery; and has a cultivated area of 393,918 acres. The imports are English piece goods, salt, and indigo; exports ghee, mustard oil, barley, wheat, rice, and live stock. The name Hazara is supposed to have been derived from a Turki family which entered India in the 14th c. The dist. has been under British rule since the second Sikh war. Pop. 367,200, chiefly Mohammedans.

HAZARAS. See AFGHANISTAN.

HAZARD, n. *hăz'ėrd* [F. *hasard*—from Sp. *azar*, unlucky throw of the dice: It. *zara*, an unlucky cast: mod. Gr. *zari*, a die]: that which falls or comes unexpectedly; chance; accident; chance of danger; venture; a gambling game played with dice; peril: V. to put in danger; to expose

to chance; to risk; to try the chance. HAZ'ARDING, imp. HAZ'ARDED, pp. HAZ'ARDOUS, a. *-ėrd-ŭs*, perilous; dangerous; that exposes to the chance of loss or evil. HAZ'ARDOUSLY, ad. *-lĭ*. HAZ'ARDOUSNESS, n. *-nĕs*, HAZ'ARDRY, n. *hăz'ėrd-rĭ*, in *OE.*, temerity; precipitation; a general term for games of chance.—SYN. of 'hazard, n.': danger; fortune; probability; peril; risk; jeopardy; hap.

HAZARD, *hăz'ėrd*, game at dice, without tables, played by any number of persons. One person, called the *caster* (his opponent who bets with him being called the *setter*), takes the box and dice, and makes a throw (called a *main*), which must be above 4, and not exceeding 9; and if the first throw made is not within these limits, the caster must throne until such a one occurs. After the caster has thrown the main, he throws his own chance. The throws 2, 3, 11, 12, are called *crabs*, and are losing throws for the caster, except in the following cases, viz., 12 when 6 is the main, 11 when 7 is the main, or 12 when 8 is the main; in these cases, and also when the caster's throw is the same as the main, the throw is called a *nick*, and the caster wins. If his throw be not a nick, or a crab, then, if he can repeat the same throw before the main turns up, he wins. If the caster throws crabs, not nicks, or if he fails to repeat his throw before the main turns up, the setter wins the stakes. The setter, on the whole, has slightly the advantage of the caster, especially if 6 or 8 be the main, when his chance is to the caster's in the proportion of 7,295 to 6,961, or 22 to 21 nearly. Hazard is exclusively a game of calculation, and is never played merely with a view to amusement. It is a game for gamblers; and it has been an incitement to the wildest schemes under the name of 'systems' that ever laughed mathematics to scorn. Owing to the intricacy of the calculations of probabilities, the odds in favor of the professional player over the amateur are 100 per cent.

HAZARD, *hăz'ėrd*, CAROLINE, American college president: b. Peacedale, R. I., 1856, June 10. She was educated in Providence and in Europe, and in 1899 was appointed president of Wellesley College, Mass., receiving the degrees of M.A. and LITT. D. from the University of Michigan and Brown University the same year. She is a granddaughter of R. G. Hazard (q.v.) and has published *The Narragansett Friends Meeting in the 18th Century* (1899); *Thomas Hazard: a Study of Life in Narragansett in the 18th Century; Narragansett Ballads;* etc.

HAZARD, *hăz'ėrd*, ROWLAND GIBSON, LL.D.: 1801, Oct. 9—1888, June 24; b. S. Kingston. R. I.: manufacturer and author. He was engaged as a woolen manufacturer from 1820 till his death. He secured the release from the chain-gang in New Orleans of many free northern negroes 1841–2, was a member of the R. I. assembly 1851–2, 54–5, and senate 1866–7, and received from Brown Univ. the degree LL.D. 1869. Among his works are the following: *Essays on the Resources of the United States* (1864), *Freedom of the Mind in Willing* (1864), *Essays on Finance and Hours of*

Labor (1868). and *Causation and Freedom in Willing*, letters to John Stuart Mill (1869).

HAZE, n. *hāz* [Icel. *hoss*, gray or dusky in color: Icel. and AS. *has*, hoarse or rough in the throat from a cold]: light vapor; mist; a slight fog. HAZY, a. *hā′zĭ*, covered or shrouded with light vapor; misty. HA′ZINESS, n. *-zĭ-nĕs*, mistiness.

HAZEL, n. *hā′zĕl* [Norw. *hasl;* Dut. *hazel-noot*, the common nut: Dan. *haze*, the beard of nuts]: a shrub or tree whose wood, being very flexible, is used for the hoops of casks, and also in turnery; the *Cŏrylus avellānă*, ord. *Cūpŭlĭfĕræ* or *Cŏrylācĕæ*, see below; in *mining*, a tough fine-grained sandstone: ADJ. of a light-brown color like the hazel-nut. HA′ZELLY, a *-lĭ*, of a light brown. HAZEL-NUT, the nut of the hazel-tree.

HAZEL, *hā′zĕl* (*Corylus*): genus of trees and shrubs of nat. ord. *Cupuliferæ*, of which the fruit is a nut in a leafy and laciniated cup, the enlarged involucre of the female flower. The male flowers are in cylindrical catkins; the female flowers appear as mere clusters of colored styles at the extremities of buds; the male flowers are conspicuous, the female flowers very small.—The COMMON HAZEL (*C. Avellana*) is a large shrub or low tree, with a bell-shaped fruit cup, which is somewhat two-leaved, open, and spreading. It is a native of all temperate parts of Europe and Asia; it is common also in North America. Hazel-nuts of improved varieties are grown to a considerable extent in s. England, particularly in Kent; they are also imported in large quantities from s. Europe. Hazel-nuts yield, on pressure, about half their weight of a bland fixed oil, often called *nut-oil* in Britain, the hazel-nut being popularly known by the term *nut* alone: but in Germany it is walnut-oil which is usually called nut-oil. Hazel-nut oil has drying properties, and is much used by painters; also by perfumers as a basis with which to mix expensive fragrant oils; and it has been employed medicinally in coughs. The wood of the hazel, though seldom large enough for the purposes of the carpenter, is very tough and flexible, and hazel-rods are therefore much used for making crates, hurdles, hoops for small barrels etc. The thicker stems of hazel are used for making charcoal which is in great request for forges, is esteemed for the manufacture of gunpowder, and is preferred by artists for crayons.

Most of the cultivated varieties of the hazel-nut are known by the name of *cob-nuts* and *filberts;* the former generally of roundish form; the latter characterized by greater elongation and laciniation of the fruit-cup; the name filbert being indeed regarded as a corruption of full-beard. The Red Filbert, or Lambert's Nut, is remarkable for having the pellicle which surrounds the kernel of a crimson-red color. The finer kinds of hazel are propagated by grafting and by layers. Hazel-plants for copses are obtained from seed.—The BEAKED HAZEL (*C. rostrata*), a species having a very hairy fruit-cup prolonged into a

long beak, is a native of the n. parts of America. Its kernel is sweet. The CONSTANTINOPLE HAZEL (*C. colurna*) the nuts of which are considerably larger than those of the common hazel, is a native of the Levant, from which the fruit is exported. It is much used for its oil, but is a less pleasant fruit than many kinds of cob-nut and filbert. A Himalayan species of hazel (*C. ferox*) has a spiny fruit-cup, and an excessively hard nut—*Barcelona nuts* are the nuts of a variety of the common hazel, kiln-dried before exportation from Spain. Hazel-nuts not subjected to this process cannot be kept long without losing in part their agreeable flavor, and contracting a sensible rancidity, except in air-tight vessels, in which they are said to remain fresh for years.

HAZELTINE, *hā'zĕl-tĭn*, MAYO WILLIAMSON, American journalist and literary critic: b. Boston, Mass. 1841, April 24. He graduated from Harvard, studied also at Oxford, practised law until 1878, and was then appointed literary editor of the New York *Sun*. He became widely known as a critic for his reviews in the *Sun*, and has published in book-form: *Chats about Books* (1883); *British and American Education*, *The American Woman in Europe*.

HA'ZEN, MARSHMAN WILLIAMS, American lawyer and author: b. Beverly, Mass., 1845. He was graduated from Dartmouth in 1866, from 1873 was a manager for the publishing firms successively of Ginn & Company and D. Appleton & Company, in 1882 was admitted to the Massachusetts bar, and in 1885 began the practice of law in New York. His publications include, besides a series of 21 school text-books: *Observation, Thought, and Expression;* a *History of the United States;* and *Government*.

HAZEN, *hā'zn*, WILLIAM BABCOCK: 1830, Sep. 27—1887, Jan. 16; b. W. Hartford, Vt.: soldier. He graduated at the U. S. Milit. Acad. 1855, July 1; was on frontier and Indian service till 1860, promoted capt. 1861, May 14; appointed col. 41st Ohio vols. Oct. 29, commanded a brigade at Corinth and Shiloh, distinguished himself at Stone River, promoted brig.gen. vols. 1862, Nov. 29; commanded a brigade in movements preceding the battle of Chickamauga, captured 18 pieces of artillery at Mission Ridge, commanded the 2d div. 15th corps in Sherman's march to the sea, assaulted and captured Fort McAllister and was promoted maj.gen. vols. on the field 1864, Dec. 13, and after receiving all the brevets up to maj.gen. U. S. A. was mustered out of the vol. service 1866, Jan. 15, and appointed col. 38th U. S. inf. July. He was an official witness of the Franco-German and Russo-Turkish wars, and succeeded the late Gen. Albert J. Myer as chief signal officer U. S. A. 1880, Dec. He employed scientists as observers, introduced 'cold wave' signals, and suggested the standard-time meridians at present in use. He published: *The School and the Army in Germany and France, with a Diary of Siege Life at Versailles* (1872); *Our Barren Lands* (1875); and *A Narrative of Military Service* (1885).

HAZLETON, *hā'zl-ton:* city; cap of Luzerne co., Pa., on the Lehigh and Pennsylvania railroads, 22 m. w. of Wilkesbarre. Situated at an altitude of 1,700 ft., it is a summer hill-resort, but is chiefly noted for its anthracite coal mines and supplemental industries. It has a large export trade in coal and the manufactured products of silk and knitting mills, foundry and machine shops, carriage factories, lumber yards, etc. Hazleton contains a state hospital for miners, fine graded schools, St. Gabriel's Academy, churches, and has gas and electric lighting, and street railroads. Settled in 1820, it received a city charter in 1890. The government is vested in the mayor, who holds office three years, and in the council. The subordinate officials are appointed by the mayor, subject to the approval of the council. Some are elected by the council. Pop. (1900) 14,230.

HAZLITT, *hăz'lĭt,* WILLIAM: distinguished English critic and essayist: 1778, Apr. 10—1830, Sep. 18; b. Maidstone, Kent; son of a (Presb.) Unitarian minister. His father went to America when Hazlitt was about five years of age, but returned in two years, and became pastor of a congregation at Wem, Shropshire. In 1793, Hazlitt became a student in the Unitarian college at Hackney, but did not like theological pursuits. In 1795, he left the college, and returned to his father's house, where he applied himself to metaphysics and painting. About this time he met Coleridge, who had come to preach in his father's neighborhood, and by the conversation of the poet was awakened to a keener intellectual life. In 1802 he visited Paris, and studied in the Louvre, and on his return he attempted to support himself by portrait-painting; but as he could please neither himself nor his patrons, he relinquished the easel and turned to literature, for which he was much better adapted. In 1803, he went to London, and soon published his essay *On the Principles of Human Action.* In 1808 he married and retired into the country. In 1811 he was again in London. In 1813 he delivered a course of lectures on the history of English Philosophy, and subsequently courses on the English poets. He wrote essays in the *Examiner* in conjunction with Leigh Hunt, republished in a vol., the *Round Table.* Other essays he collected into vols., entitled *Table-talk,* and the *Plain Speaker.* He published also *Characters of Shakespeare's Plays,* and the *Spirit of the Age.* In 1822, he was divorced from his wife, and two years afterward married a second time. His last work was the *Life of Napoleon,* of whom he was an enthusiastic admirer. Among other well-known works of Hazlitt are: *A View of the English Stage* (1818); *Lectures on the English Poets* (1818); *Lectures on the English Comic Writers* (1819); *Lectures on the Elizabethan Age* (1821). An edition of his principal works was edited by his son, and by Henly (1902); *Memoirs of William Hazlitt* were published by his grandson 1867; and there is a life by Birrell (1902).

The fame of Hazlitt rests on his essays, which are in every

sense remarkable. He has great acuteness and penetration of criticism, and occasionally a passage, by reason of passionate force and *abandon*, rises into poetry. His essays, though on the whole inferior to Lamb's and Hunt's, contain pages as striking and memorable as any in theirs.

HAZLITT, William Carew, English author: b. London, 1834, Aug. 22. He is a grandson of William Hazlitt (q.v.). He was at first a civil engineer, relinquished that profession for journalism, and finally took up that of literature. Among his works are: *History of the Venetian Republic* (1860); *Bibliographical Collections and Notes* (1876–92); *Memoirs of William Hazlitt* (1897); *Four Generations of a Literary Family* (1897); *Leisure Intervals*, poems (1897); *Ourselves in Relation to a Deity and a Church* (1897); *Coins of Europe* (1893–7); *The Lambs* (1897); *Lamb and Hazlitt* (1900); *Shakespeare: The Man and His Work* (2d ed., 1903); *Faiths and Folklore* (1905); etc.

HAZOR, or Chazor (Heb., enclosure), the name of several places in ancient Palestine, the best known of which was the seat of Jabin, a Canaanitish king of considerable power, who, with his allies, was defeated by Joshua (Josh. xi. 1–13). Though it recovered and oppressed Israel, it was conquered a second time by Barak (Judges iv.) and remained in the possession of Israel until the invasion of Tiglathpileser. Solomon made it a northern frontier fortress (1 Kings ix. 15). Its site has been variously placed, by many at Tell Hara, 2½ miles southeast of Kadesh. Consult the *Journal of Sacred Literature* for 1866, p. 245.

HE, *hē*, [AS. *he;* Dut. *hij;* Fris. *hi;* Dan. *han*, he]: pron. of the 3d pers. applied to a man or boy; poss. *his*, obj. *him;* often used as a prefix to denote the masc. gen., as *he-bear:* N. a male.

HEAD, n. *hĕd* [AS. *heafod*, a head: Dan. *hoved:* Dut. *hoofd:* Icel. *höfud*]: the uppermost part of the body containing the face, etc.; a chief person; the chief or principal part of anything; a leader; understanding or mind; a title of heading; source of a stream; the top part; the forepart, as of a ship; chief place, as *head* of affairs; each one among many, as twenty head of cattle; division of a discourse; crisis or height, as to bring or come to a *head:* V. to act as a leader to; to fit or furnish with a head; to lop off; to form a head; to go in front; to oppose; to restrain: Adj. chief; principal. Head'ing, imp.: getting in advance or ahead of: N. that which stands at the head or top, as of a subscription paper; material for heads of any sort. Head'ed, pp.: Adj. come to a head; having a head or top. Head'less, a. without a head. Headache, n. *hĕd'āk*, pain in the head, see below. Head'er, n. a plunge into water by a bather or swimmer head-foremost. Head'ers, n. plu. *-ĕrz*, bricks placed lengthwise across the wall. Heady, a. *hĕd'ĭ*, apt to affect the head; intoxicating. Head'ily, ad. *-lĭ*, in a heady manner; hastily; rashly. Head'iness, n. *-nĕs*, rashness; obstinacy. Head-borough,

in *England*, formerly, name given to the high-constable of a borough. HEAD-COURTS, in *Scotch law*, the sheriff-courts, now abolished. HEAD-DRESS, an ornamental covering for the head; also HEAD-GEAR, *-gēr*. HEAD-LAND, n. cape or promontory. HEAD-LIGHT, n. a large lamp placed on the front end of the locomotive to illuminate the track in front and thus disclose any obstructions that may exist thereon, and to signal the approach of the locomotive. It consists of an 'oil-reservoir' surmounted by an 'Argand' burner, and a parabolic 'reflector,' all of which are enclosed in a metal 'case,' which is placed on the top of the smoke-box, or supported on two 'brackets,' with a shelf between, bolted to the front of the smoke-box. HEAD'LINES, n. plu. *-līnz*, lines displayed conspicuously at the top of a page or at the beginning of a chapter. HEAD'LONG, a. head-foremost; steep; precipitous; rash: AD. rashly; precipitately; hastily. HEAD-MONEY, poll-tax, see below. HEAD'MOST, a. most advanced. HEAD'PIECE, n. the helmet of a soldier; an ornament at the head of a chapter or page of a book. HEAD'QUARTERS, n. plu. the place of general rendezvous; the residence of the officer or general in command. HEAD-SEA, the heavy sea that materially opposes a ship's progress. HEAD'SHAKE, n. shake of the head intimating doubt or denial. HEAD'-SHIP, n. dignity; chief place; authority. HEADSMAN, n. *hĕdz'măn*, an executioner. HEAD-STALL, n. *-stawl* [Icel. *stallr*, that on which anything stands or is placed]: the part of the bridle which surrounds the head. HEAD'STONE, n. a stone with inscription at the head of a grave. HEAD'-STRONG, a. self-willed; obstinate; violent; ungovernable. HEAD-TIRE, n. covering for the head of a woman, of any kind, usually ornamental; head-gear. HEAD'WAY, n. the motion of an advancing ship. HEAD-WIND, a contrary wind. HEAD OF CATTLE, a single one. HEAD OF WATER, a reservoir, or its height above the place of delivery. DOWN BY THE HEAD, said of a ship deeply laden at the bows. NEITHER HEAD NOR TAIL, neither beginning nor end; neither one thing nor the other; confused. ON ONE'S OWN HEAD, on one's own responsibility. OUT OF ONE'S OWN HEAD, without the advice or co-operation of another. OVER HEAD AND EARS, completely overwhelmed; entirely. TO HEAD OFF, to get before; to intercept. TO GIVE THE HEAD, to let go control, as, he gave his horse the *head*. TO LAY HEADS TOGETHER, to combine in a plan. TO MAKE HEAD AGAINST, to advance, to resist with success.—SYN. of 'head, n.': person; individual; chief; principal; commander; top; knob; crisis; pitch; body; conflux;—of 'head, v.': to lead; direct; govern; influence; behead; lop;—of 'headstrong': ungovernable; obstinate; violent; heady; untractable; stubborn; unruly; venturesome.

HEAD. See BRAIN; EYE; EAR; NOSE; MOUTH; TONGUE; SKULL; CAROTID ARTERY; JAW; TEETH, FACE; HEADACHE; etc.

HEAD, *hĕd*, Barclay Vincent, English numismatic scholar: b. Ipswich, Suffolk, 1844, Jan. 2. In 1864 he became an assistant in the British Museum, where in 1893 he was made keeper of the department of coins and medals. He was also appointed joint-editor of the *Numismatic Chronicle*. His chief work is the *Historia Nummorum* (1887), a valuable study, and the standard one in its department. Among further publications by him are: *History of the Coinage of Bœotia* (1881); *Guide to the Coins of the Ancients* (1881); etc.

HEAD, Sir Edmund Walker, Bart., Governor-General of Canada: 1805—1868, Jan. 28; b. Wiarton Place, near Maidstone, Kent, England. He was educated at Oriel College, Oxford, where he was first-class in classics 1827, and became fellow of Merton; succeeded his father, the seventh baronet, 1838; and 1841 became poor-law commissioner. After the breaking up of the poor-law board, he was, 1847, nominated lieut.gov. of New Brunswick. He held this post until 1854, Sep., when he succeeded the Earl of Elgin as gov.gen. of Canada. He was author of *The Handbook of Spanish Painting*, a *Tour in the Manufacturing Districts*, etc. Head was made a privy councilor 1857, and K.C.B. (civil) 1860. He resigned his post 1861.

HEAD, Sir Francis Bond, Bart.: 1793. Jan. 1—1875, July 20; b. Hermitage, near Rochester, Kent, England: gov. of Upper Canada, and author. He entered the corps of royal engineers, and had attained the rank of cap. when, 1825, he accepted an engagement from a private company to work gold and silver mines on the river Plate. He crossed the Pampas from Buenos Ayres to Chili, and on his return to London, published *Rough Notes of a Journey across the Pampas*. He was made major in the army 1828; and 1835, while assistant-commissary of the army, he accepted, after much urging, the governorship of Upper Canada. When the house of assembly stopped the supplies, as a means of obtaining redress for alleged grievances, Head dissolved the house, and the result of the dissolution was in his favor. An insurrection against his measures, after he had sent away from Upper Canada the whole of the queen's army; and putting himself at the head of the militia, he suppressed it. In 1838, he resigned and was created a baronet. He published a *Narrative* in answer to some severe strictures; he also wrote *Bubbles from the Brunnens of Nassau*, *A Fagot of French Sticks*, *A Visit to Ireland*, *The Emigrant*, *Life of Bruce the Traveller*, etc.; and he was a frequent contributor to the *Quarterly Review*. He died at Croydon.

HEAD, Sir George, English writer of travels, etc.: b. Higham Parish, Kent, 1782; d. 1855. He held various posts in the army, and was present at most of the great battles of the Peninsular. In 1814 he proceeded to Canada to be chief of the commissariat of a proposed navy on the Canadian lakes, and subsequently published his experiences in *Memoirs of an Assistant Commissary-General* and *Forest Scenes and Incidents in the Wilds of North America*

He was knighted in 1831 by William IV. He also wrote *Rome, a Tour of Many Days; A Home Tour Through the Manufacturing Districts of England*; and *A Tour Through Various Parts of the United Kingdom* and other works.

HEAD'ACHE: pain referred to the front, side, or back of the head, varying in intensity and other characters according to its cause and pathological relations. The most common varieties of headache are dependent on, or connected with, derangements of the digestion, and frequently occur after meals. Such headaches are common among young persons, especially young women leading lives of unnatural confinement within doors amid vitiated air, or given to amusements extending far into the night. The subjects of this form of headache are usually pale and feeble, or delicate and easily flushed. The cure is evident, though its practical application like other reforms in habits is often difficult. Very different is the headache caused in older persons by a 'flow of blood to the head.' In this case, the habit is usually full, the complexion florid; giddiness is apt to come on in stooping, when also the pain and sense of fullness and throbbing, characteristic of the complaint, increase. In these cases gentle purgation and restricted diet, with out-door exercise, will usually bring cure, unless there is positive organic disease. The period headache, or *hemicrania*, is a curious variety which recurs at more or less regular intervals, affecting exactly half of the head up to the middle line. It is almost invariably due to astigmatism or other abnormal ocular conditions producing eyestrain. The relief obtained by wearing properly fitted glasses, especially in persons under 50 years of age, is little short of miraculous. SICK HEADACHE, *megrim* or *migraine*, is among the most distressing and intractable forms, inasmuch as it cannot usually be referred to any distinct removable cause, and is but little under control of remedies. It is to be met, however, like the other forms, chiefly by a regulation of the whole habits of life, especially as regards habitual exercise. The element of eyestrain may enter into the causation, or at least aggravation, of any variety of headache, especially if the pain be made worse by reading, and the first thing in the treatment of recurring headache is to have the eyes carefully examined and to have glasses fitted if there be any visual defect. Attention should next be directed to the alimentary canal, for autointoxication is a prolific cause of headache. The bowels should be thoroughly moved by suitable remedies and copious injections high up in the bowels should be made, so as to insure the removal of all stagnating fecal matter in the colon. Persistent headache may be due to organic disease of the skull, the brain, or its membranes. In the beginning of most acute infectious disease severe headache is a very common symptom.

HEADINESS, HEADLONG, HEADY, etc. See under HEAD.

HEADLEY, *hĕd'lĭ*, Joel Tyler: author: b. Walton Del. co., N. Y., 1814, Dec. 30; d. Newburgh, N. Y., 1897, Jan. 16. He graduated at Union College 1839, studied for the Pres. ministry at Auburn Theol. Seminary, was compelled by ill-health to change his profession, and after a foreign tour engaged in literary work. He succeeded Henry J. Raymond as assoc. editor of the New York *Tribune* 1846. He was first to call attention to the advantages of the Adirondack region as a health resort. He published *Napoleon and His Marshals* (1846); *Washington and His Generals* (1847); *Life of Cromwell* (1848); *Sacred Scenes and Characters* (1849); *The Adirondacks, or Life in the Woods* (1849); *Life of Washington* (1857); *Life of Havelock* (1859); *Chaplains of the Revolution* (1861); *The Great Rebellion* (2 vols., 1864); *Grant and Sherman, Their Campaigns and Generals* (1865); *Sacred Heroes and Martyrs* (1865); *Farragut and Our Naval Commanders* (1867); *The Achievements of Stanley and Other African Explorers* (1877); and a reprint of sketches of Lieut. Strain's expedition to explore a route for a canal across Darien (1885).

HEADLEY, Phineas Camp, American Congregational clergyman: b. Walton, N. Y., 1819, June 24; d. Lexington, Mass., 1903. He was a brother of J. T. Headley, the historian (q.v.). He was admitted to practice at the bar in 1847, but studied theology at Auburn Seminary, held pastorates in various Presbyterian and Congregational churches, and contributed to the New York *Observer* and *Tribune*, and many other newspapers and magazines. Among his works are: *Women of the Bible* (1850); *Biographies of the Empress Josephine* (1851); *Kossuth* (1852); *Lafayette* (1853); *Mary, Queen of Scots* (1856); *Ericsson* (1863); *Farragut* (1864); and others; *Half-Hours in Bible Lands* (1867); *Court and Camp of David* (1868); and *Public Men of To-day* (1882).

HEAD-MONEY: tax of 50 cents imposed by act of congress 1882, Aug. 3, on every immigrant brought to the United States Previous to the passage of this act the state of N. Y. levied a 'head tax' on all immigrants arriving at New York, the funds going to the support of the state board of emigration. A test of the legality of the tax being made in the courts, a decision was rendered that the N. Y. statute was void because it infringed on the prerogatives of national govt. Subsequently the act of congress imposing the tax was questioned in the U S. supreme court, and a decision affirming the constitutionality of the law was made. The national act provides that the tax shall be paid—by the master or owner of the vessel bringing the immigrants—to the collector of the port, and by him turned over to the treasurer of the United States to be used by the sec. to defray the expense of regulating immigration and to relieve such immigrants as are in distress. The act also empowered the secretary of the treasury to contract with state officers to take charge of the local affairs of immigration within such state.

HEAL, v. *hēl* [AS. *hælan*, to cure: Ger. *heil*, whole: Icel. *heila*, heal—from *heil*, hale: Gr. *holos*, whole, entire]: to cure of a disease or wound; to restore to soundness or health; to reconcile; to grow healthy or sound. HEAL'ING, imp.: ADJ. mild; curative; gentle: N. act or power of curing. HEALED, pp. *hēld*. HEAL'INGLY, ad. *-lĭ*.

HEALDS, n. plu. *hēldz*, the harness for guiding the warp-threads in a loom: see HEDDLE. In weaving, the threads of the warp are so arranged, that at each passage of the shuttle forward and backward a certain number of the warp threads are raised up, and the remainder drawn down; this is done either with vertical threads, or lines, with a small loop in the middle, through which the warp thread is passed, there being one of the vertical threads for each horizontal or warp thread. The vertical threads are called healds; and as there is continual wear upon them, they should be of considerable strength. They require also to be particularly smooth and round, that they may not, by their friction in moving up and down, chafe the threads of the warp. Hence the manufacture of heald yarns is a peculiar one. For some purposes, the healds are made of metal—also a special manufacture. Heald-machines have been invented for making thread healds without knots, as the knot made by the loop is a great impediment to the free action of the heald. One is so constructed as to double and twist the single yarn, and at certain points braid and plait the yarn forming the eye or loop of the heald without knot of any kind: by this machine a series of healds can be made in a continuous cord, requiring only to be cut into lengths for use. There is also a machine which fits metallic eyes or loops in the heald.

HEALTH, n. *hĕlth* [from *heal*, from same root as HALE, WHOLE]: sound state of the body, in which the parts perform freely their natural functions; mental vigor; moral purity. HEALTH'FUL, a. *-fûl*, wholesome; salubrious. HEALTH'FULLY, ad. *-lĭ*. HEALTH'FULNESS, n. HEALTHY, a. *hĕl'thĭ*, in a sound state of body; having health; vigorous (often improperly used for *healthful* or salubrious). HEALTH'ILY, ad. *-ĭ-lĭ*. HEALTH'INESS, n. BILL OF HEALTH, a certificate of a consul, etc., as to the health of a crew, when the ship has come from a suspected port, a clean bill, a suspected bill, and a foul bill, are the three short names given to the several certified degrees of health. In *Scot. law*, the term denotes an application by a prisoner to be allowed to live out of the prison, on the ground of failing health.—SYN. of 'healthy': wholesome; salutary; sound; hale; healthful (but wholesome, salutary, salubrious, are properly syn. not of *healthy* but of *healthful*).

HEALTH: state of body or mind opposed to disease (q.v.), and characterized by the integrity, wholeness, or soundness [Lat. *sanus*] of all the parts and functions which constitute a living being. In the restricted and ordinary sense, health is understood as referring chiefly to

the body, and as indicating a perfect and harmonious play of all the functions which permit a man to be all that his proper nature implies. Even in this sense absolutely bodily health is one of the rarest of endowments; in common language, accordingly, the term is accepted with indefinite limitation, to indicate a state consistent with a life reaching its ordinary physiological limit without any manifest and considerable departure from the ideal standard.

As the absolute and extreme duration of human life is uncertain, it is usual to regard as a healthy state of the system that in which a moderate degree of activity, without pain or inconvenience, is maintained beyond the limit of threescore years and ten, as indicated by the Psalmist. In fact, however, no considerable community of human beings approaches this term of life on an average of cases. Even where the adults are more than commonly long-lived, there is always a considerable mortality at very early ages, which tends to reduce the *statistical vitality* of the whole community below the point which would be indicated by an average of 70 years for the population at large. Thus, in a population dying at the rate of only 15 in 1,000 annually (the lowest permanent rate in the returns of the registrar-general for England), the average age at death of the community, supposing the population to be absolutely free from change, would be only 66.6; and in case of a death-rate of 20 in 1,000, the average age at death would be 50; while a death-rate of 25 in 1,000 would correspond to an average age at death of not more than 40. Setting aside fluctuations of population, which always affect the result of such calculations, the average duration of life in England and in Wales is about 45 years, and in Scotland somewhat less than 50 years; and to the extent expressed by these figures, the health of these two countries falls short of the ideal standard(See VITAL STATISTICS). This department of science has assumed great importance of late years, in Britain and the United States, through efforts to improve the sanitary condition of great towns and country districts by improving drainage and sewerage, a regulated supply of pure water, and the inspection, in certain circumstances, of lodging-houses, and even of private dwellings, to prevent overcrowding, and other manifest causes of the spread of epidemic disease. It is known that the average length of human life has increased in the present century. The great practical reforms which tend toward this constitute the object of the 'Public Health' movement: See SANITARY SCIENCE; HEALTH, BOARDS OF; BACTERIOLOGY; PHYSIOLOGY; VITAL STATISTICS; ETC.

HEALTH, BOARDS OF. In the United States a board of health is national, state, district, county, city, village or township in character. Such a board has resting upon it the duty of preserving the health and comfort of the citizens within its jurisdiction. Each board should have police power in dealing with sanitary problems. One of the special functions of such a board is that of outlining the methods to be pursued in the prevention and control

of communicable diseases, but it is also its duty to regulate and control any trade, occupation or condition that may be injurious to health, or indecent or offensive.

The types of boards of health in the United States are shown in the following:

United States Public Health Service.—This, a bureau, is under the Treasury Department at Washington. It was created in 1902 by an act enlarging the functions of the U. S. Marine Hospital Service. This bureau, as it now exists, has six divisions, each presided over by an assistant surgeon-general. The divisions are as follows: (1) marine hospital and relief; (2) domestic quarantine; (3) foreign and insular quarantine and immigration; (4) sanitary reports and statistics; (5) personal accounts; (6) scientific research.

There is also a 'miscellaneous division' presided over by an assistant surgeon.

Under the first is the control of the marine hospitals, 22 in number, in which are treated annually about 60,000 patients; also 110 relief contract stations; also the sanatorium for consumptives at Fort Staunton, New Mexico, which is located on a ranch occupying 56 square miles. This sanatorium receives the consumptives from the various marine hospitals.

The work of the second division is gradually being enlarged. To it is delegated matters relating to maritime quarantine stations, interstate quarantine, and quarantine along the Canadian and Mexican borders.

Under the third division is the regulation of national quarantine in the insular possessions of the United States, and the procedure of officers detailed for duty in foreign ports. It also has control of all matters relating to the medical inspection of immigrants.

The work of the fourth and fifth divisions is apparent from the titles.

To the sixth division is referred all matters relating to the work of the hygienic laboratory. This laboratory has in addition to its regular staff an advisory board consisting of 'three competent experts detailed from the army, the navy and the bureau of animal industry,' together with 'five other members to be appointed by the surgeon-general of the U. S. Public Health and Marine Hospital Service, with the approval of the Secretary of the Treasury.'

Under the federal law provision is made for conferences between this national health organization and other sanitary bodies as follows:

(1) The surgeon general may invite as many of the health and quarantine authorities as he may deem necessary, whenever in his opinion the interests of the public health would be promoted thereby, to confer with him.

(2) A conference between the U. S. Public Health Service and all the sanitary boards of the states and territories, and the District of Columbia, must be called at least once each year.

(3) Upon the application of not less than five state or territorial boards of health, quarantine authorities, or state health officers, the surgeon-general must call a conference, but in this event only those states joining in the request are to be invited to the conference.

(4) A conference between the hygienic laboratory officials and its advisory board at the discretion of the surgeon-general, such conference not to exceed 10 days in any one fiscal year.

The work of the Public Health Service is carried on under the supervision of commissioned medical officers ranking as surgeon-general, assistant surgeon-general, surgeons, passed assistant surgeons, and assistant surgeons. The laboratory may have, in addition to commissioned medical officers, competent non-commissioned individuals to have charge of special work in chemistry, zoology, and pharmacology.

The president may, at his discretion, utilize the Public Health Service 'in times of threatened or actual war to such extent and in such manner as shall in his judgment promote the public interest, without, however, in anywise impairing the efficiency of the service for the purpose for which the same was created and is maintained.'

State Sanitary Organizations.—In the United States these vary greatly in character and in duties assigned them. As a rule, they have a membership varying from five to nine. These members are appointed by the governor of a state for different periods in different states. Occasionally the duties of a state sanitary organization are performed by a single state official known as the state health officer or the state health commissioner. These single officials are appointees of a governor and have an uncertain tenure of office. In states with boards of health the executive officer of the board is generally chosen by the board. Such officer may or may not be a member of the board, according to the laws of each particular state. In some states the tendency is to appoint members to these boards for purely political reasons, with a short tenure of office. In other states political lines are ignored in the appointment of members of such a board, and under such circumstances the tenure of office is apt to cover a series of years through re-appointments. The secretary or executive officer is in many instances kept in office for a considerable time. It is becoming a generally recognized fact that a long service for the members of such a board, as well as for the executive officer, produces the best results. The duties of a state sanitary organization may be purely advisory to local boards of health, or advisory and executive. There is a tendency at the present time to extend the executive functions of state boards, giving them greater power over local conditions and local officials. The executive officer of a state board of health should be a medical man specially trained in sanitary matters. Such a position should be recognized as a specialty in medicine.

State boards of health should keep in touch with each other and with the National Health Service in order that uniformity in methods and regulations may prevail. They must also keep in touch with the local boards of health (county, city, village and township) in order that they may advise wisely in dealing with local affairs.

An ideal state sanitary organization would be one in the nature of a commission consisting of three or more members, all salaried men, and all constantly on duty. The commissioners should be appointed for comparatively long terms (six years at least) in order to eliminate politics, so far as possible, from such important scientific undertakings, The executive officer or secretary of such an organization should be chosen by the commissioners to hold office so long as he performs his duties satisfactorily.

District Sanitary Organizations.—There is at present a tendency in certain states to create sanitary districts, in which the authority is quite similar to that of the state organization, and much superior to that of the smaller local sanitary organizations. In these districts the intent is to employ men thoroughly trained in sanitary work, such men to give their entire time to the work. A state board of health, working with and through such district officials, is in position to accomplish a greater amount of good than would be possible where the local work was entirely dependent upon local men not specially trained in sanitation, poorly paid for their services as sanitarians and dependent largely for their livelihood upon their services rendered as general practitioners.

County Boards of Health.—These should be organized along similar lines to those of district sanitary organizations, but it is often difficult to secure such compensation for county officials as to insure competent services. County boards, if properly organized, can be of great service to the locality, acting as advisors both to the state and the village or township sanitary authorities.

City Boards of Health.—The sanitary needs of great municipalities are such as to demand constant supervision and enforcement of hygienic laws. A few American cities are well governed and policed by sanitary officials. Too often, however, the sanitary appointees of a city represent the political offscouring. The higher officials seldom retain their positions more than a few years and rarely are able to give their entire time to the important work entrusted to them, The employees, are as a rule, not the choice of the men employing them, but the nominees of ward politicians.

Village Boards of Health.—These are generally composed of men thoroughly interested in the welfare of their communities and ready to perform the duties imposed upon them by their official position, or to carry out the instructions given them by some higher authority—county district or state. Local conditions make it almost imperative in many instances that the local board of health shall act under instructions largely, rather than from its own

initiative. The task of keeping a village in good sanitary condition is often a thankless one, bringing abuse and criticism upon the conscientious official.

Township Boards of Health.—These are generally composed of farmers, untrained in sanitary science. As a rule, these are ex-officio boards consisting of township supervisors or similar officials. Their work consists largely in looking after the care of quarantinable diseases. In many states they are required to appoint a medical health officer who serves as their sanitary advisor.

The sanitary problems in the United States will never be properly handled until sanitarians are recognized as a special class of scientific men, the same being taken out of the political atmosphere which now envelopes them. The sanitary officials of England and of the more advanced European countries have many advantages over the sanitarians of the United States, for they are to a great extent free from political control and engaged in the life work of their choice.

HEALY, *hē'lĭ*, George Peter Alexander: portrait-painter: b. Boston, 1813, July 15; d. Chicago, Ill., 1894, June 24. In 1836 he removed to Paris, where he spent the greater part of his life, though passing some years in Boston, Chicago, and Rome. Besides painting nearly 600 portraits within 20 years, he completed *Webster's Reply to Hayne*, 130 portraits (in Faneuil Hall, Boston) 1851, *Franklin before Louis XVI.*, 1855, and several portraits for the centennial exhibition at Philadelphia 1876, and the *Paris Salon*, 1878. He was an honorary member of the National Acad. of Design, and contributed to many of its exhibitions. His portraits include many distinguished people of the United States and Europe.

HEALY, Timothy Michael, Irish political leader: b. Bantry, County Cork, Ireland, 1855, May 17. He was elected to Parliament for Wexford in 1880, County Monaghan in 1883, South Londonderry in 1885, North Longford in 1887, and County Louth, North, in 1895. In 1884 he was called to the Irish bar, in 1903 to the English bar and in 1905 became a Bencher at King's Inn. He became known as a leader of the Irish Nationalist party, was a founder of the Dublin *National Press* (later combined with the *Freeman's Journal*), and was repeatedly in difficulties because of his public utterances on political matters. He made a lecture tour of the United States with Dillon and Parnell in 1880, and in 1881 participated in the Land League convention at Chicago, when $250,000 were contributed to the Irish cause. The *Healy Clause* of the Land Act of 1881, providing that no tenant should pay rent on improvements made by him, was introduced by him. He wrote *A Word for Ireland* (1886).

HEAM, n. *hēm* [AS. *hame*, the birth, the womb]: the after-birth among beasts.

HEAP, n *hēp* [AS. *heap;* Ger. *haufe;* Icel. *hópr*, a heap, a crowd; Dut. *hoop*, a heap]: a pile or mass consisting of many single things; a collection, as of ruins: V. to

throw or lay together single things in a mass or pile; to accumulate; to amass or lay up. HEAP'ING, imp. HEAPED, pp. *hēpt*. TO HEAP UP, to accumulate in great quantity.—SYN. of 'heap, v.': to amass; pile; collect; crowd; throng; cluster.

HEAP, DAVID PORTER, American engineer: b. San Stefano, Turkey, 1843, March 24. He studied at Georgetown (D. C.) College, was graduated from the United States Military Academy in 1864, served in the civil war with the engineer corps of the army of the Potomac, and was brevetted captain for his services. In 1895 he attained the grade of lieutenant-colonel of engineers. He was for years employed in the construction of fortifications and the improvement of harbors, and in 1881 was military representative of the United States at the Paris congress of electricians. He was appointed colonel 1903, April 13; brigadier-general and retired 1905, Feb. 15. In addition to a *Report on the International Exhibition of Electricity at Paris* (1884), he published: *Ancient and Modern Light-Houses* (1889); *Electrical Appliances of the Present Day; Engineer Exhibit, Centennial Exhibition* (1882); and *History of the Application of Electricity to Lighting the Coasts of France* (1885).

HEAR, v. *hēr* [AS. *hyran;* Icel. *heyra,* to hear; Swiss. *hor,* an interjection to still an unquiet ox; Swiss, *hören;* Ger. *hören;* Goth. *hausjan,* to hear]: to perceive by the ear, to attend or listen to willingly; to attend; to listen; to obey; to try in a court of law, to be told; to receive by report; to receive intelligence or news; in *OE.*, to bear a name; to acknowledge as a title. HEAR'ING, imp.: N. the faculty or sense by which sound is perceived; see EAR: audience; judicial trial; extent within which sound may be heard. HEARD, pp. *hėrd,* did hear. HEARER, n. *hēr'ėr,* one who. HEARSAY, n. *hēr'sā,* report; rumor; common talk (see HEARSAY EVIDENCE). HEAR, HEAR, an exclamation calling forcible attention to certain words of a speaker, while speaking, without necessarily expressing approval. HEARING IN PRESENCE, in *Scot. law,* the hearing of a difficult or important case before all the 13 judges of the court of session. HEARING OF A CAUSE, trial in a court of equity in the United States, on the merits of a case—an 'equity cause' being distinguished from a 'common-law action.' HEARING-TRUMPET, an instrument for collecting sounds and conveying them to the ear.

HEARING, SENSATIONS OF. The ear experiences two distinct forms of auditory sensation, i.e., tone and noise. Tones originate from bodies which vibrate in regular periods, noises come from irregular non-periodic vibrations or from less than two complete periodic vibrations. Tones and noises are ordinarily complex and generally occur together. Thus, a note struck on a piano gives in addition to the noise of the stroke a series of tonal sensations of which the one which is lowest in pitch is strongest and gives to the note its musical name. But one can

with a little practice easily detect the numerous higher over-tones which also are audible. When a dog barks at a distance at night, although we think of the sound as a noise, we can readily notice that it has pitch, and sometimes such distant barking is distinctly musical. The human voice is a good example of sounds which contain both noise and tone.

The normal ear can hear as tones sound vibrations which occur from sixteen to twenty-four times a second. Slower vibrations occasion simply sensations of puffing or throbbing of the air. When the vibrations exceed 40,000 a second, few people can detect tone, but certain sensitive ears can apparently discern as tone vibrations as rapid as 50,000 a second. Differences in the intensity of sounds as heard are dependent upon alterations in the amplitude of the air waves, greater amplitude being connected with increased loudness. Pitch is dependent upon the number of vibrations per second, and the tone-quality, or timbre, depends upon the composition of the sound wave, i.e., the number, relative strength and pitch of the over-tones which are present. This it is which gives different musical instruments their characteristic 'voice.'

In addition to the tones which we ordinarily recognize when we hear musical notes, we find upon close observation that we hear a large number of other secondary tones known as combination tones. These tones are occasioned in part by the physical conditions outside the body, and in part are perhaps due to the action of the ear itself. Authorities are not agreed upon the facts as a whole, nor upon their theoretical explanation. One of these groups of tones are called difference tones, another summation tones, others interruption tones, etc. The difference tones are some of them of a pitch equal to the difference in vibration rate of the two generating tones. For example, the tones originating from vibrations of 512 and 640 per second would produce a difference tone of 128, i.e., two octaves below the first tone. The summation tone corresponds in vibration rate to the sum of the vibrations of the generating tones. In the case of the tones mentioned a few lines above, this would be 1,152. The full facts about these secondary tones are too complex to enter upon here, but it should be understood that the tones are constantly present in musical experience and that they produce a very considerable part of the total tonal effect which we receive.

The direction of sounds is determined by the intensity with which they affect the two ears and partly by the difference in the tone quality, or timbre, of the tones which reach the two ears. The tones which come from a complex sound, unless the sound be in the median plane of the head, reach the ears with their overtones quite differently affected by the interposition of the bones of the head, by the conch of the ear, etc. They have a different quality for the two ears. Localization in the median plane is extremely difficult, as can be easily demonstrated by

having a person close his eyes and then snapping one's fingers in the median plane above, in front and behind. The location of the sound will be very uncertain. The judgment of the distance of sounds is very uncertain, unless one has some extraneous experience to look to for help. The buzzing of a small insect near at hand may sound like the droning of a bee at some distance.

Total deafness is not infrequent, and if brought on in infancy is likely to result in dumbness, unless special training is received. Tone deafness is a condition in which certain tones are not discriminated. Partial deafness in one or both ears may disturb the power to localize sounds.

For the facts about the anatomy and physiology of the ear, see EAR.

HEARN, *hërn*, DAVID WILLIAM, American Roman Catholic clergyman and educator: b. Boston, Mass., 1861, Nov. 21. He was graduated at Boston College in 1880; took postgraduate courses in literature, science and philosophy for five years, and theological courses for four; entered the Society of Jesus, and was ordained priest of the Roman Catholic Church. He was successively professor in Georgetown University, vice-president of Boston College, and vice-president of the College of Saint Francis Xavier, New York. In 1900 he became president of Saint Francis Xavier.

HEARN, LAFCADIO, American author: b. Santa Maura (Leucadia), Ionian Islands, 1850, June 27; d. Tokio, Japan, 1904, Sep. 26. Educated in England and France, he came to the United States in 1869, was a journalist in Cincinnati and New Orleans, in 1887–9 was at Saint Pierre, Martinique, French West Indies, and in 1890 went to Japan. He became a Japanese subject with the name Yakumo Koizumi, and was appointed lecturer in English literature at the Imperial University of Tokio. His *Stray Leaves from Strange Literature* (1884), and *Some Chinese Ghosts* (1887), were succeeded by *Chita: A Memory of Lost Island* (1889), story of the destruction of 'L'Ile Dernière,' once the watering-place of Louisiana fashion, which attracted attention by its descriptive powers; and *Two Years in the French West Indies* (1890), which gained new interest through the Martinique disaster of 1902. Among his further works, dealing almost exclusively with things Japanese and revealing a thorough comprehension of and sympathy with the art, myth, tradition, and philosophy of the Orient, are: *Out of the East* (1894); *Glimpses of Unfamiliar Japan* (1895); *Kokovo* (1896); *Gleanings in Buddha-Fields* (1897); *Exotics and Retrospections* (1898); and *Kotto*, or *Japanese Curios* (1902).

HEAR'SAY EV'IDENCE: evidence given in a court of justice at second-hand, when the witness states not the things which he himself saw or heard, but what somebody else said. This evidence is, as a general rule, inadmissible, because the axiom is, that the best evidence that can

be had must be produced. If evidence were admitted at second-hand, there would be no limit to its uncertainty, and there would be thus introduced vague statements of absent persons, who not being sworn when they made them, cannot be punished if they speak falsely.

HEARSE, n. *hėrs* [OF. *herce;* F. *herse:* OF. *herce;* It. *erpice*—from mid. L. *hirpĭcem* a harrow]: a carriage for conveying the dead to the grave: V. to inclose in a hearse. HEARS'ING, imp. HEARSED, pp. *hėrst*. HEARSE'LIKE, a. suitable to a funeral; mournful.

HEARST, *hėrst*, PHOEBE APPERSIN, American philanthropist: b. 1840. She was for a time a teacher, and in 1861 married George F. Hearst of California. She has been active in charitable and philanthropic enterprises and has given largely, especially to educational institutions. In San Francisco she has established kindergarten classes for the children of the poor, and a manual training school, and has organized a number of working girl's clubs. She has also given money to build a National Cathedral School for girls; has made donations to the American University at Washington; has established and given largely to public libraries in the mining towns of the West; and maintained a school for mining engineers at the University of California. She paid the expenses of an international competition of architects to obtain a suitable plan for a campus and buildings for the University of California, (q. v.) and agreed to erect two buildings in accordance with the accepted designs.

HEARST, WILLIAM RANDOLPH, newspaper publisher and politician, 1862, b. San Francisco. After graduation at Harvard, he became publisher of the San Francisco *Examiner*, formerly owned by his father, Sen. Hearst of Cal.; in 1895 bought the N. Y. *Journal*, now the *American;* in 1900 started the Chicago *American*, the morning issue of which is now called the *Examiner*, and in 1904 the Boston *American* and the Los Angeles *Examiner*. In 1902 he presented the Greek theatre (q.v.) to the University of California. He was elected mem. of Congress 1903 for the 11th N. Y. dist.; was defeated in 1905 by a narrow margin for the mayoralty of N. Y. city and in 1906 was candidate for governorship of N. Y. state.

HEART, n. *hârt* [AS. *heorte;* Dut. *hart;* Icel. *hjarta;* Goth. *hairto;* Skr. *hardi;* Gr. *kardĭă*, the heart]: the organ in animals which, by alternately contracting and expanding, sends the blood through the arteries, to be again received by it from the veins (see CIRCULATION OF THE BLOOD; HEART, DISEASES OF THE; HEART, SOUNDS OF THE): the vital, inner, or chief part of anything; the centre or interior; the seat of the affections and passions; disposition of mind; courage; spirit: V. to become close or hard in the centre, as a cabbage. HEART'ING, imp. HEART'ED, pp. HEART'LESS, a. void of feeling or affection; faint-hearted; without courage. HEART'LESSLY, ad. *-lĭ*. HEART'LESSNESS, n. dejection of mind; want of courage.

HEART'ED, a. laid up or sealed in the heart—usually used as the latter part of a compound, as *hard-hearted*. HEART-'SOME, a. *-sŭm*, merry; lively. HEARTY, a. *hârt'ĭ*, proceeding from the heart; warm; sincere; zealous; full of health; vigorous; plentiful, as a meal. HEART'ILY, ad. *-lĭ*, from the heart, fully. HEART'INESS, n. state of being hearty; sincerity; ardor; eagerness of appetite. HEART-ACHE, anguish of mind; sorrow. HEART-BLOOD, blood from the heart; the life. HEART-DEEP, rooted and felt in the heart. HEART-BREAKING, overpowering with grief or sorrow. HEART-BROKEN, a. intensely grieved or afflicted. HEART-BURN, n. pain, heat, and uneasiness about the region of the stomach. HEART-BURNING, a cause of discontent; deep-seated, secret enmity. HEART-DEAR, much beloved. HEART-EASE, quietness; tranquillity. HEART-FELT, a. deeply and sincerely felt. TO TAKE HEART OF GRACE, to pluck up heart; to take good heart. HEART-GRIEF, in *OE.*, deep sorrow. HEART-PIERCING, very acute or affecting. HEART-RENDING, deeply afflictive. HEART-SEARCHING, searching the secret thoughts and purposes. HEART'S-EASE, n. *hârtz'ēz*, a plant; the *Vĭŏlă trĭcŏlŏr*, ord. *Vĭŏlācĕæ;* the violet or pansy. HEART-SICK, sick at heart; pained in mind. HEART-SICKENING, sickening or paining the heart. HEART-SORE, deeply wounded; that pains the heart. HEART-STIRRING, moving the feelings; also HEART-TOUCHING. HEART-STRINGS, the nerves or tendons supposed to brace or sustain the heart HEART-STRUCK, fixed and rooted deeply in the heart; impressed indelibly on the mind; dismayed by sudden fear or bad news. HEART-WHEEL, a contrivance for converting circular into rectilinear motion. HEART-WOOD, the innermost layers of wood in exogenous trees, more deeply colored and harder than the rest; the duramen. HEART-WHOLE, with the affections untouched; having the vital energies unimpaired. HARD-HEARTED, unfeeling; cruel. FAINT-HEARTED, wanting in courage; liable to sink under difficulties or trials. AT HEART, as regards the heart; really. BY HEART, fixed in the memory; in a most thorough manner. TO BREAK THE HEART, to reduce to despair or hopeless grief. TO FIND IN THE HEART, to be willing or disposed. TO SPEAK TO ONE'S HEART, to speak home to; to encourage. TO LAY TO HEART, to be much affected. TO LOSE HEART, to become discouraged. TO SET THE HEART ON, to fix the desires on. TO TAKE TO HEART, to be much concerned about; to be cast down and depressed in spirit by. WITH ALL MY HEART, with right good-will; sincerely. HEART TO HEART, with unreserved sincerity. HEARTY-HALE, in *OE.*, good for the heart.—SYN. of 'heart, n.': affection; inclination; memory; ardor; conscience; strength; power; vigor; efficacy; life;—of 'heartily': really; sincerely; cordially; actively; diligently; vigorously; eagerly; zealously; warmly; ardently; earnestly;—of 'hearty': undissembled; strong; hard; durable; cordial; frank; candid; open; ingenuous; real; unfeigned; earnest.

HEART, Diseases of the: (except pericarditis): Diseases of the heart are common, frequently serious and fatal affections. Experience has taught that when a man has heart-disease, he must be very careful in his manner of living and often with the best of care the probability is that he will not live his four-score years and ten.

There are heart diseases and heart diseases—some exceedingly mild, others very severe. They may be classified into organic, those cardiac diseases in which some definite diseased lesion can be found in the organ if examined after death, and functional, or those in which it has been impossible to find any diseased condition to account for the symptoms. Again the diseases of the heart may be classified into congenital, or those which exist at the time of birth and acquired, those which develop after birth. The congenital diseases refer to various malformations, such as a heart with a single cavity, an opening between the two auricles or between the two ventricles, etc. In this condition the arterial and venous blood are not kept separate in the heart but are intimately mixed, the venous passing directly from the right to the left side of the heart and thence to all parts of the body without being properly oxygenated in the lungs. This pumping of venous blood to all parts of the body gives the individual a blue color and produces a condition that is called 'blue disease,' and since such individuals are affected from the time of birth they are frequently called 'blue babies.' This lack of a proper circulation interferes with the proper development of the child. The blood stasis produces an enlargement of the lips and end of nose, also a clubbed condition of the fingers. Such individuals usually die very early in life. Occasionally they develop into adults but never become very useful members of society.

The heart may also be misplaced during the period of development—usually to the right side of the body, the condition being called dextro-cardia.

In considering the acquired organic diseases of the heart we should distinguish between the diseases of the heart muscle or myocardium and the endocardium, the lining of the heart cavities. The principal disease conditions of the heart muscle are softening, fatty transformation and inflammation. Softening of the heart or myomalacia cordis is usually caused by some occlusion of the principal blood vessels supplying the heart muscle. The softened area represents a weakened point which forms a predisposition to rupture of the organ which is always followed by sudden death. When we speak of a fatty heart we may refer to one of two quite different processes. One is fatty degeneration, which represents a transformation of the heart muscle itself into fat, and results either through the action of poisons such as phosphorous, arsenic or the poisons from infectious diseases,—or through poor nutrition such as occurs in severe anemia. On the other hand, fatty infiltration refers to the accumulation of fat between the muscle fibers of the heart and is the result of over

nutrition or the leading of too sedentary a life, or the ingestion of too much alcohol which permits the storing of fat. Fatty degeneration is always a grave process. It causes a weakening of the heart muscle and when once well developed the heart never completely returns to the normal. Fatty infiltration is not so grave, the heart muscle is not necessarily destroyed and it usually disappears as soon as the fatty condition of the general system is removed.

Inflammation of the heart muscle may be acute or chronic—acute is usually the result of a poisoning of the system as in case of diphtheria when the heart may suddenly fail—chronic is usually the result of long continued chronic causes, such as alcohol, lead poisoning, overwork, etc.

In the majority of instances when we speak of heart disease we refer to the inflammation of the valves of the heart or endocarditis, or what is often called valvular disease. This inflammation affects the valves of the left side far more frequently than those on the right side. As regards their duration we speak of acute and chronic endocarditis. Of the acute form there are two varieties: First, simple or warty, so-called because it is mild in character and is characterized by the formation of fibrinous warty vegetations on the edge of the valve leaflets; second, ulcerative or malignant, characterized by the formation of ulcers, and almost invariably results in death of the individual. Although a number of causes, such as excessive work, etc., may predispose to acute endocarditis, it is nevertheless almost always, bacterial in origin; the more mild bacteria producing the simple form—the more virulent the malignant form. Simple endocarditis usually follows such diseases as rheumatism, tonsilitis, scarlet fever, typhoid fever, etc., and is caused by the bacteria which produces those disease processes. Malignant endocarditis usually follows pneumonia, erysipelas, puerperal fever and systemic bacterial infection. Although the malignant form of endocarditis usually terminates in death, recovery usually follows the simple form. In many cases, however, the valve leaflets are so deformed, destroyed or thickened that it produces either one or both of the two following conditions: (1) Narrowing of the valve opening or stenosis; (2) Inability for the valve to completely close the opening or what is called insufficiency of the valves permitting a return of the flow of blood or regurgitation. Both of these conditions throw an increased amount of work upon the heart. If this increased amount of work comes on gradually and there is sufficient nutrition, the heart undergoes what is called compensatory hypertrophy or an enlargement to compensate for the increased amount of work thrown upon it. If the nutrition is very poor, as in case of illness or old age, then hypertrophy fails and there develops a dilatation of the heart which always means a very weak organ. Diseases of the heart valves are not the only causes of hypertrophy. It may be caused by over stimulation as by excessive use of alco-

hol, tea or coffee, or by undue physical exertion requiring an increased amount of blood to all parts of the system. Such is frequently the case with athletes and the so-called 'athletic heart' is simply an enlarged hypertrophic heart which in itself does not represent a diseased condition and which usually again returns to the normal after the individual ceases his undue exertion.

Among the functional affections of the heart are such as palpitation which refers to irregular and forcible action of the heart causing it to become perceptible to the individual. Such occurs more frequently in women than in men, and it occurs especially in nervous people or at times of nervous excitement, such as fright, emotions of various kinds, etc. It may also be caused by the excessive use of such substances as tobacco, coffee, tea or alcohol. Occasionally it is associated with organic diseases of the heart. Other functional diseases are arrhythmia or irregular heart; tachycardia or rapid heart; bradycardia or slow heart and heart block, in which condition the heart stops beating for a considerable period. Another condition, which is sometimes associated with heart diseases, is called 'angina pectoris' or breastpang. This condition is usually associated with a thickening of the coronary arteries which are the principal blood vessels of the heart and is characterized by paroxysms of agonizing pain beginning in the region of the heart and extending to the neck and arms.

Symptoms of Heart Disease.—The symptoms of heart disease are very variable. They may vary from scarcely perceptible symptoms when the affection is very mild or when the organ is undergoing a compensatory hypertrophy to very pronounced symptoms readily recognized by the patient himself. The symptoms of the different forms of heart disease vary considerably and every person with a heart disease should be placed under the care and guidance of a physician. Among the more common symptoms are such as palpitation, rapid heart, headache, dizziness, flashes of light and a feeling of faintness on arising. Sometimes there is pain in the region of the heart which may extend up to the neck and down the arms; in more severe cases there is shortness of breath (dyspnœa) and swelling of the feet and blueness of the skin. If the heart valve is partly destroyed the blood regurgates from one cavity to another during the contraction of the heart producing murmurs usually imperceptible except to the keen ear of the physician. Sometimes, however, they are so loud as to be distinctly heard by the individual himself and those near him.

The Treatment of Heart Disease.—Diseases of so important an organ as the heart require careful treatment especially during the acute stages. Some forms of heart disease are benefited by drugs that stimulate the organ such as digitals and strychnia, but the thing of greatest value to be borne in mind especially by the patient is rest, which should be absolute during the acute stages—rest together with a proper diet to build up the nutrition and

enable the heart to undergo a sufficient enlargement to carry on its function. A person who has had a severe attack of heart disease or who has a fatty heart or a valvular lesion should bear in mind that his heart is not capable of supplying the system with an increased amount of blood on such short notice as the normal heart. He should, therefore, not indulge in any sport or engage in any work that will cause undue physical exertion. If men with chronic disease of the heart will take things easy, avoid excitement, live a temperate life and observe the proper rules and laws of hygiene they may live to a ripe old age.

HEART, SOUNDS OF THE: two successive sounds heard on applying the ear to the cardiac region of a living man or mammal, in a state of health; each pair of sounds corresponding with one pulsation. These are known as the *first* and the *second* sound. There is scarcely any interval between these two different sounds, the second one following immediately on the conclusion of the first; but after the second sound there is a perceptible pause before the first sound is again heard. The *first* sound is dull and prolonged, while the *second* is short and sharp, and the difference between them is well expressed by articulating the syllables lubb dŭp.

The cause of the first of these sounds has been a subject of much discussion, at least 30 explanations of its mode of production having been offered. During the first sound, several distinct actions are taking place, to each of which it has been described by different physiologists. Thus we have (1), the impulse of the apex of the heart against the side of the chest; (2), the contraction of the muscular walls of the ventricles; (3), the tension of the auriculo-ventricular (tricuspid and mitral) valves; (4), the rush of blood through the narrowed openings of the aorta and pulmonary artery; and (5), the collision of the particles of blood with one another, and their friction against the side of the heart's cavities.

The hearts of mammals being constructed like those of man, give out sounds different in degree, but not in character, from the sounds heard in man. In birds (except the ostrich and the apterix, whose hearts approximate to the mammalian type), there is no perceptible difference between the first and second sound. The action of the heart in reptiles (alligator, python, and turtle) seems to be accompanied with no definite sounds.

When the valves are changed by disease, the sounds undergo special alterations, which are of the highest importance in diagnosis.

HEARTH, n. *hârth* [AS. *heorth;* Ger. *herd*, floor, hearth; Dut. *haard*, the hearth of a forge: Swiss, *herd*, soil, ground]: the large flat stone placed in front of a fire-place, and generally on a level with the floor; the fireside; one's home. HEARTH-MONEY, a tax formerly imposed in England, on hearths and fire-places; abolished under William and Mary. HEARTH-RUG, n. a thick, ornamental piece of carpet-work laid on a hearth or in front of a fire-place.

HEAT, n. *hēt* [Icel. *hita*, heat, boiling, *heitr*, hot: Ger. *hitze*, heat, passion—from *hetzen*, to set on dogs, to incite: Sw *hetsa*, to set on, to heat]: the sensation experienced on approaching or touching a hot body; hot air or weather; redness or flush of face; a form of energy usually manifested by a rise of temperature or expansion; strong excitement or agitation; ardor; fervency; in *horse-racing*, a single round of the course, constituting one completed race: see DEAD-HEAT, under DEAD; a race: a course: V. to make hot; to become warm; to warm with passion or desire; to excite. HEAT'ING, imp. (see WARMING AND VENTILATION): ADJ. stimulating; exciting. HEAT'ED, pp. HEAT'ER, n. that which warms or makes hot. HEAT-APOPLEXY, name for sunstroke (q.v.).

HEAT: unknown cause of the sensation of warmth, and of a multitude of common phenomena in nature and art. In considering this subject scientifically it is necessary, at the outset, to discard the ideas conveyed by the popular use of such words as heat and cold. A number of bodies, however different, left for a long enough time in the same room, must, as we shall see further on, acquire the same *temperature*, or become in reality equally warm. Yet in popular language, some, as metals, stones, etc., are pronounced to be cold, and others, as flannel and fur, warm. The touch, then, is *not* a means by which we can acquire a definite idea of the temperature of a body.

Nature of Heat.—A heated body is no heavier than it was before it was heated; if, therefore, heat be a material substance, as it was long considered, it must be *imponderable*. And, in fact, under the name of caloric or phlogiston, it is classed in almost all but modern treatises, as one of the family of imponderables. But if it were *matter*, in any sense of the word, its quantity would be unchangeable by human agency. Now we find that there are cases in which heat is produced in any quantity without flame, combustion, etc, as in melting two pieces of ice by rubbing them together, and also cases in which a quantity totally disappears. This is utterly inconsistent with the idea of the materiality of heat. The only hypothesis that at all accords with the phenomena is, that *heat is a form of motion*, and with this idea we shall start.

Measure of Heat—Whether it be a vibration, such as light and sound (in some cases, it certainly is), or consist in a succession of *impacts* of the particles of bodies on each other as (in some cases it has been considered to be), it is none the less certain that the *amount* of heat in a body is to be measured by the vis-viva (see FORCE) of moving particles. But as we cannot observe those particles so as to ascertain their vis-viva, we must have some means of measuring the temperature of a body, depending upon an *effect* of heat. Whatever that effect may be, it is obvious that, as the laws of nature are uniform, it will afford a *reproducible* standard, by which we can estimate its amount at any time and in any place, and compare that amount with another observed somewhere else; just as the French mètre (q.v.)

is reproducible at any time, being the ten-millionth part of a quadrant of the meridian.

Dilatation or Expansion.—Now, the most general and notable effect which heat produces on matter is to *expand* it. The length of a metallic bar varies with every change of temperature, and is ever the same at the same temperature. The fixing of a tire of a cart-wheel is a very good instance. No hammering could fit an iron hoop so tightly on the wood-work of the wheel, as the simple enlarging of the tire by heat, and its subsequent contraction by cold. It is thus possible to *slip* it on, and an enormous force is secured to bind the pieces together. In almost every kind of structure, the expansion and contraction from changes of temperature require to be guarded against. In the huge iron tubes or beams of bridges, the mere change of the seasons would produce sufficient changes of length to tear the piers asunder, were each end of a tube fixed to masonry. Watches and clocks, when not compensated (see PENDULUM), go faster in cold weather, and slower in hot, an immediate consequence of the expansion or contraction of their balance-wheels and pendulums.

If a flask *full* of water or alcohol be dipped into hot water or held over a lamp, a portion of the liquid runs over: a glass shell which floats in a vessel of water, sinks to the bottom when the water is heated: and as water is heated, the hotter water continually rises to the surface. Indeed, if the latter were not the case, it would be impossible to prevent explosions every time we attempted to boil water or any other fluid. If a bladder, partly filled with air, and tightly tied at the neck, be heated before a fire, the contained air will expand, and the bladder will be distended. As it cools, it becomes flaccid again by degrees.

These and like instances are sufficient to show us that *in general* all bodies expand by heat. In order, then, to prepare a reproducible means of measuring temperature, all that we have to do is to fix upon a substance (mercury is commonly used) by whose changes of volume it is to be measured, and a reproducible temperature, or rather two reproducible temperatures, at which to measure the volume. Those usually selected are—that at which water freezes, or ice melts, and that at which water boils. In both of these cases, the water must be *pure*, as any addition of foreign matter in general changes the temperature at which freezing or boiling takes place. Another important circumstance is *the height of the barometer:* see BOILING. The second reproducible temperature is therefore defined as that of water boiling in an open vessel when the barometer stands at 30 inches. In absolute strictness, this should be said, also of the freezing-point, but the effect on the latter of a change of barometric pressure is practically insensible. For the practical construction of a heat-measurer, or *Thermometer* on these principles, the various ways of graduating it, and how to convert the readings of one thermometer into those of another: see THERMOMETER. In the present article, we suppose the Centigrade thermometer to be the one used.

If we make a number of thermometer tubes, fill them

with different liquids, and graduate as in the Centigrade, we shall find that, though they all give 0° in freezing, and 100° in boiling water, no two in general agree when placed in water between those states. *Hence the rate of expansion is not generally uniform for equal increments of heat.* It has been found, however, by very delicate experiments, which cannot be more than alluded to here, that mercury expands *nearly* uniformly for equal increments of temperature. However, what we sought was not an *absolute* standard, but a *reproducible* one; and mercury, in addition to furnishing this, may be assumed to give us also the ratios of different increments of temperature.

We must next look into the nature of dilatation by heat. And first, of its *measure*. A metallic rod of length l at 0°, increases at $t°$ by a quantity which is proportional to t and to l. Hence k being some numerical quantity, the new length $l' = l(1 + kt)$. Here k is called the coefficient of linear dilatation. For instance, a brass rod of length 1 foot at 0° becomes at $t°$, $(1 + \cdot 0000187t)$ feet; and here k, or the coefficient of linear dilatation for one degree (Centigrade), is 0000187; or a brass rod has its length increased by about $\frac{1}{53\,000}$th part for each degree of temperature.

If we consider a bar (of brass, for instance) whose length, breadth, and depth are l, b, d—then, when heated, these increase proportionally. Hence,

$$l' = l(1 + kt),$$
$$b' = b(1 + kt),$$
$$d' = d(1 + kt);$$

therefore the volume of, or space occupied by, the bar increases from V or lbd to V′ or $l'b'd'$.

Hence $V' = V(1 + kt)^3$,

$= V(1 + 3kt)$, nearly, since k is *very small*.

Therefore we may write $V' = V(1 + Kt)$, where we shall have as before K, the coefficient of *cubical* dilatation for 1° of temperature. And, as $K = 3k$, we see that, for the same substance, the *coefficient of cubical dilatation is three times that of linear dilatation.*

In the following table, these coefficients are increased a hundredfold, as it gives the proportional increase of volume for a rise of temperature from 0° to 100° Centigrade. It must also be remarked that while the *linear* dilatation of solids is given, it is the cubical dilatation of liquids and gases which is always observed. Moreover, as the latter are always measured in glass, which itself dilates, the results are only *apparent;* they are too small, and require correction for the cubical dilatation of glass. This, however, is comparatively very small, and may in general be neglected.

Glass	·00086	Water	·0466
Iron	·00122	Alcohol	·116
Zinc	·00294	Air	·3665
Mercury	·01543	Hydrogen	·3668

There is one remarkable exception to the law that bodies expand by heat -viz., that of water, under certain circum-

stances. From 0° (Centigrade), at which it melts, it *contracts* as the heat is increased, up to about 4° C, after which it begins to expand like other bodies. We cannot here enter into speculations as to the cause of this very singular phenomenon, but we will say a few words about its practical utility. Water then, is *densest* or *heaviest* at 4° C. Hence, in cold weather, as the surface water of a lake cools to near 4°, it becomes heavier than the warmer water below, and sinks to the bottom. This goes on till the whole lake has the temperature 4°. As the cooling proceeds further, the water becomes *lighter*, and therefore remains on the surface till it is frozen. Did not water possess this property, a severe winter would freeze a lake *to the bottom*, and the heat of summer might be insufficient to remelt it all.

Specific Heat.—The thermometer indicates the *temperature* of a body, but gives us no direct information as to the *amount* of heat that it contains. Yet this is measurable, for we may take as our UNIT the amount of heat required to raise a pound of water from 0° to 1°, which is of course a definite standard. As an instance of the question now raised—Is *more* heat (and, *if so, how much more*) required to heat a pound of water from zero to 10°, than to heat a pound of mercury between the same limits? We find by experiment that bodies differ extensively in the amount of heat (measured in the units before mentioned) required to produce equal changes of temperature in them.

It is a result of experiment (sufficiently accurate for all ordinary purposes) that if equal weights of water at different temperatures be mixed, the temperature of the mixture will be the arithmetical mean of the original temperatures. From this it follows, with the same degree of approximation, that equal excessive amounts of heat are required to raise the same mass of water through successive degrees of temperature. As an instance, suppose one pound of water at 50° to be mixed with two pounds at 20°, the resulting temperature of the mixture is 30°; for the pound at 50° has lost 20°, while each of the other two pounds has gained 10°. Generally, if m pounds of water at t degrees be mixed with M pounds at T degrees (the latter being the colder), and if θ be the temperature of the mixture—the number of units lost by the first is $m\ (t - \theta)$, since *one* is lost for *each* pound which cools by *one* degree; and that gained by the second is $\mathrm{M}\ (\theta - \mathrm{T})$, and these must be equal. Hence $m\ (t - \theta) = \mathrm{M}\ (\theta - \mathrm{T})$, whence, at once,

$$\theta = \frac{mt + \mathrm{MT}}{m + \mathrm{M}};$$

But if we mix water and mercury at different temperatures, the resulting temperature is found *not* to agree with the above law. Hence it appears that *to raise equal weights of different bodies through the same number of degrees of temperature, requires different amounts of heat.* And we may then define the *specific heat* of a substance as the number of units of heat required to raise the temperature of *one* pound of it by *one* degree

By the definition of a unit of heat, it is at once seen that the specific heat of water is unity; and, in general, the specific heats of other bodies are less, and are therefore to be expressed as proper fractions. For example, if equal weights of water and mercury be mixed, the first at 0°, the second at 100°, the resulting temperature will not be 50° (as it would have been had both bodies been water), but 3°·23 nearly—in other words, the amount of heat which raises the temperature of 1 pound of water 3°·2, is that which would raise that of 1 pound of mercury 96°·77, or the specific heat of mercury is $\frac{1}{30}$th that of water. The following may be given as instances of the great differences which experiment has shown to exist among bodies in respect of specific heat: Water, 1·000; turpentine, ·426; sulphur, ·203; iron, ·114; mercury, ·033.

It is mainly to the great specific heat of water that we are indebted for the comparatively small amount of it required to cool a hot body dropped into it; for its comparatively small loss of temperature when it is poured into a cold vessel, and for the enormous effects of the water of the ocean in modifying climate.

It has been found generally, with a few exceptions that the specific heats of bodies are nearly *inversely* as their atomic weights (q v.). *Hence all atoms require the same amount of heat to produce the same change in their temperature.* Thus, for simple bodies, we have atomic weight of mercury, 100; its specific heat, ·033; product, 3·3; atomic weight of iron, 28; its specific heat, ·114; product, 3·2. A similar remark may be made, it appears, with reference to compound bodies of the same type; but, in general, the product of the specific heat and the atomic weight differs from one type to another.

Latent Heat, Fusion, Solution, and Vaporization.—We are now prepared to consider the somewhat complex effects produced by heat on the molecular constitution of bodies; and, conversely, the relations of solidity, fluidity, etc., to heat. All bodies (except carbon, which has been *softened* only) have been melted, by the application of a proper amount of heat. The laws of this fusion are:

1. *Every body has a definite melting-point, assignable on the thermometric scale, if the pressure to which it is subjected be the same.*

2. *When a body is melting, it retains that fixed temperature, however much heat may be applied, until the last particle is melted.* The last result is most remarkable. The heat applied does not raise the temperature, but *produces the change of state.* Hence it seemed to disappear, as far as the thermometer is concerned, and was therefore called *latent* heat.

A pound of water at 79° C. added to a pound of *water* at 0° C., produces, of course, 2 pounds of water at 39°·5. *But*, a pound of water at 79° C. added to a pound of *ice* at 0° C., produces 2 pounds of water at 0°. Heat, then, has *disappeared* in the production of a change from solidity to fluidity. And this we might expect from the conservation of energy (see FORCE), for actual energy in the shape of

heat must be consumed in producing the potential energy of the molecular actions in the fluid. For every pound of ice melted, without change of temperature, 79 units of heat are thus converted into change of molecular arrangement.

We give a few instances of latent heat of fusion: Water (as above), 79·0; zinc, 28·1; sulphur, 9·4; lead, 5·4; mercury, 2·8.

In law 1, it is mentioned that constancy of pressure is necessary. In fact, the freezing (or melting) point of water is *lowered* by increase of pressure, while those of sulphur and wax are *raised;* but these effects, though extremely remarkable, are *very small.* Most bodies contract on solidifying; some, however, as water, cast iron, type-metal, etc., *expand.* Thus, a severe frost setting in after copious rain splits rocks, etc., by the expansion of freezing water; and thus also we obtain in iron the most delicate and faithful copy of a mold, and in the fusible alloy a clear-cut copy of a type. The modern dynamical theory of heat enables us to see that a perpetual motion would be procurable, if bodies which contract on solidifying had *not* their melting point raised by pressure, and *vice versâ.*

Analogous to the fusion of a solid is its *solution* in a liquid, or the mutual conversion into liquids of two solids, intimately mixed in powder. Here, also, we should expect actual energy in the shape of heat, to be used up in producing the potential energy of the fluid state; and, indeed, such is always the case. Such changes of arrangement destroy heat, or produce cold; but this in many cases is not the effect observed, as heat is generally developed by the *loss* of potential energy, if there be *chemical* action between the two substances. Hence, in general, the observed effect will be the difference of the heat *generated* by chemical action, and that *absorbed* in change of state.

If a quantity of pounded nitrate of ammonia (a very soluble salt) be placed in a vessel, an equal weight of water added, and the whole stirred for a minute or two with a test-tube containing water, the heat required for the solution of the salt will be abstracted from all bodies in contact with the solution, and the water in the test-tube will be frozen. In this sense, the compound is called a *freezing mixture.* For additional illustrations of heat becoming latent, see FREEZING MIXTURES.

Of course the converse of this may be expected to hold, and latent heat to become sensible when a liquid becomes solid. As an example, when a saturated solution of sulphate of soda begins to deposit crystals of the salt, the temperature rises very considerably; and it is the disengagement of latent heat that renders the freezing of a pond a slow process, even after the whole of the water has been reduced nearly to the freezing-point.

Vaporization.—Almost all that has been said on the subject of fusion is true of vaporization, with the change of a word or two. Thus, however much heat we apply to a liquid, the temperature does not rise above the boiling-point. Heat, then, becomes *latent* in the act of vaporization, or rather is *converted into* change of state. It is found

by experiment that 540 units of heat (each sufficient to heat a pound of water 1° C.) disappear in the conversion of a pound of water into steam. Hence a pound of steam at 100° C. is sufficient to raise 5·4 pounds of water from zero to the boiling-point.

Communication of Heat.—There are at least three distinct ways in which this occurs, and these we will take in order.

Conduction.—Why is it that if one end of a poker and of a glass or wooden rod be put into a fire, we can keep hold of the other end of the latter much longer than we can of the former? The reason is, that heat is more readily transmitted in the iron from particle to particle, than it is in glass or wood. This is conduction. It is to be noticed, however, that in this experiment a great portion of the heat which passes along each rod is given off into the air by the surface. The mathematical theory of conduction has been most exquisitely investigated by Fourier, and after him by Poisson, but on the supposition that the rate at which heat passes from a warmer to a colder portion of a body is proportional to the *difference* of temperature. As most of the experiments which have been made with the object of ascertaining the *conductivity* (*not* conductibility, the erroneous word in common use) of different bodies have been made in this way, it is not surprising that our knowledge on this point is very meagre indeed. We know that silver conducts better than most other metals, and that the metals in general conduct better than other solids; but here our present information ends. It is satisfactory to know, however, that the defects of the old methods are now fully acknowledged, and that the important element of conductivity will shortly be accurately known for all important substances. Forbes has recently shown that the conductivity of iron diminishes as its temperature increases; and the same is probably true of other bodies. This invalidates the conclusions of the mathematical theories above mentioned, but the necessary corrections will be easily applied when the experimental data are completely determined.

In conjunction with their radiating power (see next section, the conductivity of bodies is most important as regards their suitableness as articles of clothing for hot or cold climates, or as materials for building or furnishing dwelling-houses. We need but refer to the difference between linen and woolen clothing, or to the difference (in cold weather) of sensation between a carpet and a bare floor, in order to show how essential the greater or less conducting power of bodies is to our everyday comfort.

Radiation.—By this is understood the passage of heat, not from particle to particle of one body, but through air or vacuum, and even through solid bodies (in a manner, and with a velocity quite different from those of conduction) from one body to another. There can be no doubt whatever as to radiant heat being *identical* with light, differing from red light, for instance, as red light differs from blue: i.e., having (see LIGHT) longer waves than those corresponding to red light. This idea might easily have arisen during the contemplation of a body gradually heated. At

first, it remains dark, giving off rays only of heat; as its temperature increases, it gives us, with the heat, a low red light, which, by the increase of the temperature, is gradually accompanied by yellow, blue, etc., rays, and the incandescent body (a lime-ball, for instance) finally gives off a light as white as that of the sun, and which, therefore, contains all the colors of sun-light in their usual proportions. In fact (see FORCE), there is great reason to believe that the sun is merely a mass of incandescent melted matter, and that the radiations it emits, whether called heat or light, merely differ in *quality*, not in *kind*. Taking this view of the subject at the outset, it will be instructive to compare the properties of radiant heat with those of light throughout.

Light, then, *moves* (generally) *in straight lines*. This is easily verified in the case of heat by the use of the thermo-electric pile (q.v.) and its galvanometer. Placing the pile *out* of the line from a source of heat to an aperture in a screen, *no* effect is observed; but deflection of the needle at once occurs when the pile is placed in the line which light would have followed if substituted for the heat.

A concave mirror, which would bring rays of light proceeding from a given point to a focus at another given point, does the same with heat, the hot body being substituted for the luminous one, and the pile placed at the focus. Heat, then, is *reflected* according to the *same laws* as light. A burning lens gives a capital proof of the sun's heat and light being subject to the same laws of *refraction*. When the solar spectrum (q.v.) is formed by means of a prism of rock-salt (the reason for the choice of this material will afterward appear), the thermo-electric pile proves the existence of heat in all the colored spaces, increasing, however, down to the red end of the spectrum, and attaining its maximum *beyond* the visible light, just as if heat were (as it *must* be) light with longer waves.

Some bodies, as glass, water, etc., transmit, when in thin plates, most of the light which falls on them; others, as wood, metal, colored glass, etc., transmit none or little. A plate of rock-salt, half an inch thick, transmits 96 per cent. of the rays of heat which fall on it; while glass, even of a thickness of one-tenth of an inch, transmits very little. In this sense, rock-salt is said to be *diathermanous*, while glass is said to be a diathermanous, or only partially diathermanous. The question, however, cannot be considered as finally settled, since some of Tyndall's results are so startling as to require further research and confirmation.

But there are other remarkable phenomena of radiant heat easily observed, which have their analogy in the case of light. 1. Unstained glass seems equally transparent to all kinds of light. Such is the case with rock-salt and heat. 2. Light which has passed through a blue glass (for instance) loses far less per cent. when it passes through a second plate of blue glass. Similarly, heat loses say 75 per cent. in passing through *one* plate of crown glass, and only 10 per cent. of the remainder (say) in passing through a second. 3. Blue light passes easily through a *blue* glass,

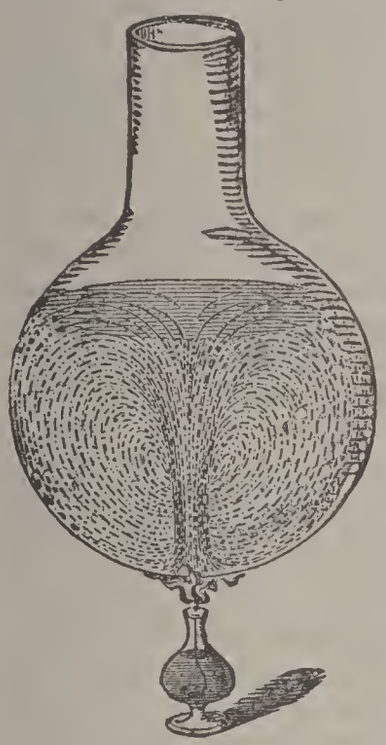
which almost entirely arrests red light. So dark heat passes far less easily through glass than bright heat does. These analogies, mostly due to Melloni, are very remarkable.

Again, light can be *doubly refracted, plane, polarized, circularly polarized.* All these properties have been found in heat by Principal Forbes (q.v).

The beautiful investigation of Stokes and Kirchoff on the solar spectrum have shown us that bodies, which most easily *absorb* light of a particular color, when heated, give off most freely light of that color; and it is easily shown by experiment, that those surfaces which absorb heat most, readily, also radiate it most readily. Thus, it was found by Leslie, that when a tinned-iron cube full of boiling water had one side polished, another roughened, a third covered with lampblack, etc., the polished side radiated little heat, the roughened, more, while the blackened side radiated a very great quantity indeed. And again, that if we have (say) three similar thermometers, and if the bulbs be (1) gilded, (2) covered with roughened metal, (3) smoked, and all be exposed to the same radiation of heat, their sensibility will be in the order 3, 2, 1. A practical illustration of this is seen in the fact, that a *blackened* kettle is that in which water is most speedily boiled, while a polished one keeps the water longest warm when removed from the fire. Again, if a willow-pattern plate be heated white-hot in the fire, and then examined in a dark room, the pattern will be reversed—a white pattern being seen on a dark ground. This experiment of Stewart's is very remarkable, and virtually constitutes an anticipation of Kirchoff's results leading to the explanation of the fixed lines in the spectrum (q.v.). It is this law of radiation and absorption that mainly gives rise to the superior comfort of white clothing to black in winter as well as in summer: radiating less in winter, it absorbs less in summer.

Much has been argued about the separate existence of *cold*, from such fact as these: A piece of ice held before the thermo-electric pile, produces an opposite deflection of the galvanometer to that due to a hot ball. If a freezing mixture be placed at one focus of a spheroidal mirror, and a thermometer with a blackened bulb at the conjugate focus, the latter will fall speedily, though very far off from the mixture. Now, the real explanation of such observations is to be found in what is called the 'Theory of Exchanges,' first enunciated by Prevost, and since greatly extended and carefully verified by Stewart, which is to this effect: 'Every body is continually radiating heat in all directions, the amount radiated being (nearly) proportional to its own temperature.' Hence the apparent radiation of cold in the experiments above mentioned is due to the fact of the pile or thermometer *radiating off more heat than it receives*, as its temperature is higher than that of the freezing mixture to which it is opposed. From this it is evident that any number of bodies left near each other tend gradually to assume a common temperature. By this theory of exchanges, we explain the cold felt in sitting opposite a window on a frosty day, even when there is no draught.

Convection.—A hot body cools faster in a current of air than in a still atmosphere of the same temperature, evidently because fresh supplies of the colder air are continually brought into contact with it. It is by convection mainly that heat is conveyed from particle to particle in liquids and gases. Thus, when a lamp is applied to the bottom of a vessel of water, the heat does not diffuse itself in the water as it would (by conduction) in a mass of metal, but the expansion of the heated water at the bottom rendering it lighter, bulk for bulk, than the superincumbent fluid, causes it to rise to the surface; and thus, by convection, the heat is diffused to the mass. Conduction, properly so-called, can scarcely be shown, even if it really exists, in liquids or gases, on this account. The tremulous appearance of any object, as seen by light which passes near a hot surface, as that of a boiler or a red-hot poker, is due to the convection of heat in the air, the warm current refracting light less than the cold air. (See VENTILATION.) For the mechanical applications of heat, see STEAM-ENGINE; CALORIC ENGINE; etc.



Sources of Heat.—They may be, so far as we know, ultimately reduced to two—chemical combination, and mechanical force; and, indeed, in all probability, the former is only a variety of the immensely different forms in which the latter is manifested. For a more full examination of this point, and a general statement of the ultimate nature of the various sources of heat, see FORCE; also COMBUSTION; FUEL.

HEATER-COCKS. Cocks attached to the back end of the boiler, by which steam is blown through the feed-pipes, to prevent them from freezing in cold weather.

HEAT SPOT, or HOT SPOT: small points or areas upon the skin which respond with peculiar sensations of warmth when stimulated. Other points on the skin are relatively insensitive to moderate stimulations of heat. Temperatures above the surface temperature of the body afford the normal stimuli for eliciting these sensations, but certain observers have produced them with electrical currents and with mechanical tapping, Whether there are independent end-organs for these sensations is still a matter of debate. It seems fairly certain that some sort of differentiation of nervous structure must distinguish these sensations from those of cold and of pressure.

HEATH, n. *hēth* [Goth. *haithi*, the open country: Icel. *heidi*, a waste: Ger. *heide*, a heath, a waste: comp. Gael

uath, solitary, lonely]: a small narrow-leaved flowering shrub of various species, very common on certain high lands—called in Scotland *heather* (q.v.); the common *heather* or ling is *Callūnă vulgārĭs*, ord. *Ericācĕæ;* a tract of land covered with heath; an open waste tract of land. HEATHY, a. *hēth'ĭ*, abounding with heath. HEATH-COCK, called also HEATH-POUT, a large fowl found on heaths; a species of grouse. HEATH-PEA, a species of wild vetch; a species of *Lath'yrŭs*, ord. *Legūmĭnōsæ*.

HEATH, *hēth*, (*Erīca*): genus of small shrubs of nat. ord. *Ericeæ* (q.v.), distinguished by a calyx of four leaves, a bell-shaped or ovate—often ventricose—corolla, and a 4-celled, 4-valved capsule, with dissepiments from the middle of the valves. The leaves are small, linear, and evergreen. The genus, as thus defined, has been broken by some botanists into a number of genera, but the old name, *Erica*, is still commonly retained. The name heath, however, is, in popular language, extended to many plants of genera nearly allied to *Erica;* and the little shrub which chiefly covers the large tracts named *moors* or *heaths* (Ger. *Haide*) in Britain and on the continent of Europe is *Callūna vulgaris*. The genus *Calluna* has been separated from *Erica*, chiefly on account of differences in the capsule, and of the presence of four bracts resembling an outer calyx. *C. vulgaris*, the common LING or HEATHER, is the only species known. It is found on arid places, also in bogs. The flowers have much the appearance of being in spikes; they are of a lilac rose color, rarely white. The various depth of color in the flowers of different plants dds much to the beauty of a hill-side covered with heath in the end of August. The flowers afford abundance of honey, and beehives are therefore transported to the moors when the heather is in bloom. In bogs, it contributes much to the formation of peat. In some of the Hebrides, a decoction of heath is used for tanning leather. The plant is applied to various other uses in the Highlands of Scotland. Cottages are often thatched with it, and some of the poorest are mostly built of it, in layers with the roots inward, and mixed with earth and straw. Beds are also made of it, placed in a sloping direction, with the tops upward, and are said to be very soft and elastic. Besoms and scrubbing brushes are made of it. In the Island of Islay, ale is made by brewing one part of malt and two of the young tops of heather and this is supposed to be the same beverage which was anciently used by the Picts. In Scotland, the malicious setting fire to a heath is a felony called Muirburn; it is a felony in England also. Of the genus *Erica*, about 500 species are known; and these, with few exceptions, are natives of s. Africa. It has long been supposed that none are found in America, but in recent years isolated plants have been found in various parts of New England, and in regions farther north. The British Isles produce seven species, of which some have been found only in Ireland, and some in the s.w. of England. CROSS-LEAVED HEATH (*E. tetralix*) and FINE-

LEAVED HEATH (*E. cinerea*) are common in most parts of Britain, and like most of the genus, are very beautiful when in flower. The *heather-bells* of Scottish song are the flowers of one or both of these species. A sprig of *E. cinerea* was the badge of the Macdonalds at the time when they existed as a distinct clan. *E. Mediterranea* and *E. carnea*, common in s. Europe, are very frequent ornaments of British flower-borders, hardy plants, producing their flowers in great profusion in April Many species, remarkable for size and beauty of flowers are cultivated in green-houses; and heath-houses are sometimes erected for the purpose. Some of the s. African or Cape heaths attain in their native region a much greater size than any European heath except *E. arborea*, which in the Pyrenees sometimes grows to the height of 20 feet.

HEATH, *hēth*, FRANCIS GEORGE, English writer: b. Totnes, Devon, 1843, Jan. 15. He entered the civil service as a clerk of the higher division in the customs department in 1862, and was transferred as surveyor to the outdoor division of that department in 1882. In 1896 he founded and in 1897 became editor of the *Imperial Press*, in connection with which he directed from 1896 the publication of the *Imperial library*. He published: *The Romance of Peasant Life* (1872); *The Fern World* (1877, 10th ed. 1902); *Our Woodland Trees* (1878); *Where to Find Ferns* (1881), and other volumes.

HEATH, PERRY SANFORD, American journalist and politician: b. Muncie, Ind., 1857, Aug. 31. He learned the printer's trade, in 1877 became a newspaper reporter, in 1878–80 was editor of the Muncie *Times*, and in 1881 established the *Pioneer* at Aberdeen, S. D. In 1881–93 he was a correspondent at Washington, D. C., in 1894–6 president and general-manager of the Cincinnati *Commercial-Gazette* (now the *Commercial Tribune*), and in 1897–1900 was first assistant postmaster-general of the United States. In 1900 he was elected secretary of the republican national committee.

HEATH, WILLIAM: 1737, Mar. 7—1814, Jan. 24; b. Roxbury, Mass.: soldier. He was brought up on a farm, was active in the militia before the revolution, became col. of the Suffolk regiment and commander of the Ancient and Honorable Artillery Co., of Boston, 1770; was in the general assembly 1761, 71–74; and provincial congress 1774–75; appointed brigadier-general 1774, drilled the forces at Cambridge before the battle of Bunker Hill, promoted major-general provincial troops 1775, June; appointed brigadier-general continental army 1775, June 22, and major-general 1776, Aug. 9; opposed the evacuation of New York, commanded on the Highlands after the battle of White Plains, and commanded the posts on the Hudson from 1779 till the close of the war. He was Massachusetts state senator 1791–2, became judge of probate in Norfolk co., Mass., 1793, and was elected lieutenant-governor 1806, but declined the office.

HEATHCOTE, *hēth'kōt*, CALEB: 1665, Mar. 6—**1721**, Feb. 28; b. Chesterfield, England: merchant. He settled in New York 1691; engaged successfully in mercantile business; became a royal councilor of the province 1692; led the movements which resulted in the organization of Trinity (Prot. Episc.) Church in New York, and the introduction of episcopacy in Westchester co., N. Y., and Conn.; was receiver-general of the province 1697, 1702; mayor of New York 1711–14; and judge of admiralty for the provinces of N. Y., N. J., and Conn., and surveyor-general of the customs for all the British colonies n. of Va. from 1715 till his death.

HEATHEN, n. *hē'thĕn* [from *heath;* Goth. *haithno*, a heathen woman: Ger. *heide*, a heathen—from Goth. *haithi*, the open country: Dut. *heyden*, a clown, a heathen—from *heyde*, a heath—*lit.*, one who lived on the heaths or moors and not in a walled town, among whom idolatry was longer prevalent]: one who knows not the true God; a worshipper of idols; a pagan; a very ignorant person: ADJ. pertaining to; pagan; gentile. THE HEATHEN, idolaters. HEATHEN'ISH, a. *-ĭsh*, rude; ignorant; of or relating to heathens.

HEATHER, n. *hĕth'ĕr* [from HEATH, which see]: that which grows on the heath; in *Scot.*, the common name for heath. HEATH'ERY, a. *-ĭ*, abounding in heather or heath. HEATHER-BELLS, blossoms of a kind of heather; the Scotch bluebell, of which *harebell* may be a mere corruption: see HAREBELL, under HARE.

HEATING SURFACE: the entire surface of a steam boiler, comprising the surfaces exposed to the heat on one side, and the surfaces in contact with the water on the other side.

HEA'TON, AUGUSTUS GEORGE, American artist: b. Philadelphia, Pa., 1844, Apr. 28. He was the first pupil from the United States to study at the Paris Beaux-Arts, where he was trained by Cabanel. Later (1878–80) he was in the studio of Léon Bonnat, and exhibited considerably at the Salon. Among his paintings are: *Washington at Fort Duquesne*; *The Recall of Columbus*, engraved on the 50-cent Columbian Exposition stamp of 1893; a portrait of Bishop Bowman; and *Hardships of Emigration*, engraved on the 10-cent Omaha Fair stamp. He wrote *The Heart of David—the Psalmist King* (1900); *Fancies and Thoughts in Verse* (1904); etc.

HEATON, JOHN HENNIKER, English publicist: b. Rochester, Kent, England, 1848. He was for some time prominent in Australian journalism and has sat in the House of Commons for Canterbury from 1885. He carried the Imperial Penny Postage Scheme in 1898 July, introduced telegraph money orders into England, the parcel-post to France, and has been connected with other progressive schemes. He has published: *Manners and Customs of the Aborigines of Australia*; *Australian Men of the Time*; etc.

HEATON, John Langdon, American journalist: b. Canton, N. Y., 1860, Jan. 29. He was graduated from St. Lawrence University in 1880, entered journalism as a member of the Brooklyn *Times* staff in 1881, and in 1897 became assistant editor of the New York *World*. His publications are: *The Story of Vermont* (1889); *Stories of Napoleon* (1895); *The Book of Lies* (1896); *The Quilting Bee* (1896); etc.

HEAVE, v. *hēv* [Goth. *hafjan;* Icel. *hefja;* Dut. *heffen;* A.S. *hebban;* Ger. *heben,* to lift]: to raise or force from the breast, as a sigh; to lift; to throw or cast with strong effort; to cause to swell; to pant; to rise with pain; to swell and fall; to have an inclination to vomit; to raise, as an anchor: N. a rising or swell; exertion or effort upward, in *mining* the displacement of a vein or bed when thrown upward by the intersection of another vein or fault. Heav'ing, imp.: Adj. throwing upward from the breast; swelling; panting: N. a rising or swell. Hove, pt. or pp. *hōv,* or Heaved, *hēvd.* Heaves, n. plu. *hēvz:* see Broken Wind. Heave-offering, something heaved or lifted up; among the *Jews,* a tenth of the tithes, etc., received by the Levites, which was offered by heaving or elevating. Heaving the log, sing the log to ascertain the rate the ship is going at. To heave to, to bring a ship's head to the wind and stop her motion. To heave in sight, to make its first appearance.—Syn. of 'heave, v.': to raise; lift; swell; exalt; elevate; puff; elate; throw; cast; retch.

HEAVEN, n. *hĕv'n* [AS. *heofon;* Icel. *hifinn* and *himinn;* Goth. *himins;* Ger. *himmel,* an arched or vaulted covering, the sky, heaven: OS. *heban,* a covering, heaven—*lit.,* a vaulted covering]: the place where the divine glory is manifested, and the abode of the blessed; great happiness; the region or expanse above us; the sky; the supreme power; God. Heav'enly, a. *-lĭ,* supremely excellent; godlike; celestial; pertaining to, resembling, or inhabiting heaven; delightful: Ad. in a manner resembling that of heaven. Heav'enliness, n. state or quality of being heavenly; supreme excellence. Heav'en-born, of surpassing genius; native of heaven. Heav'en-bred, grand and impressive as if produced in heaven. Heav'enward, ad. *-wĕrd,* toward heaven. Heavenly-minded, having the thoughts and affections placed on heaven or heavenly objects. Heaven of heavens, the highest heaven as distinguished from the air and firmament; according to the Jews, the dwelling place of God and the angels.

HEAV'EN: in popular Physical Science, means the expanse which surrounds the earth, and which to a spectator on the earth's surface appears as a vast arch or vault, in which are seen the sun, moon, and stars. The earliest idea entertained of this expanse was of a solid vault or hemisphere with its concavity turned downward (see Firmament).—In Theology, the word 'heaven' may be explained to mean that portion of the infinite space in which the Lord of all things, though present throughout all, is supposed to

give more immediate manifestations of His glory. Of the belief in the existence of some such special scene of the presence of the Deity, most of the known religions of the world, ancient and modern, present abundant evidence. Aristotle declares that all men, whether Greeks or barbarians, have a conception of gods; and all agree in placing the habitation of the gods in the most elevated region of the universe. Plato is equally explicit. Even Epicurus teaches the same doctrine; and one of the treatises deciphered from the papyri of Herculaneum is a treatise by him, in which the position and the other characteristics of the habits of the gods are minutely discussed. The same may be said of the Persian, the Egyptian, the German, the Scandinavian, and in general of all the ancient religions in which the belief of the existence of a supreme being assumes a form other than the pantheistic; and even in the pantheistic religions, though the philosophers may have adhered to the strict pantheistic view, and may have denied that any special locality could be regarded as the peculiar seat of the Deity, yet we find the popular belief and the popular worship even in such religions plainly founded on the contrary supposition. In addition, however, to the idea of its being the special scene of God's glory, the word heaven designates also the place, or the state or condition, of the blessed spirits, and of the souls of just men admitted into the participation of the divine beatitude. In the religious system of the Greeks and Romans, none were supposed to be admitted to the heaven of the gods except the deified heroes or demigods; but with them the Elysian Fields of the lower worlds held, morally speaking, the place now held by heaven in relation to the great doctrine of the divine retribution for the good and evil actions of human life. The Elysium of the classic mythology is in essential respects the natural equivalent of the heaven of the just. The Pythagorean doctrine of metempsychosis approached nearer to it in form, for it supposed that the soul, after the purification of successive transmigrations, was elevated to a higher and incorporeal condition in the cosmos. The doctrine of Plato was still more explicit. Although skepticism was rather the rule than the exception, it may be said in general that all the philosophical systems which included the belief of the immortality of the soul, involved also at least in substance, the idea of a state of happiness as the reward of a virtuous life. The happiness, however, of the heaven of these various creeds differed widely from the spiritual delights of the heaven of revelation, each nation and each class forming to itself its own ideal of enjoyment. The delights of the classical Elysium were, at all events in part, delights of sense. The German warrior had his war-horse and his armor laid in his grave, that he might be able to pursue, after death, the fierce enjoyments in which he had delighted while in this world. The paradise of the Indian hunter is but a richer and more extensive hunting ground. Still, not only these, but even the more grovelling conceptions of the paradise of other races, must be regarded as a natural mani-

festation of the same instinct, or as a remnant, however overlaid by error and superstition, of the same primeval revelation which is developed in the scriptural idea of heaven. Accommodating itself to the popular conceptions of the Jews, the biblical phraseology frequently implies the notion of the solid firmament already described; but the word, according to the common acceptation among Christians, is generally used simply to signify the peculiar abode of the Most High, and the special seat of His glory, in which the angels minister before Him, and the blessed spirits abide in perpetual adoration and delight. This abode of perfect bliss is believed to have been opened to the just after the passion of the Lord Jesus and his ascension into heaven. Out of the just of the old dispensation, only Enoch and Elijah are recorded to have been directly admitted to heaven; the patriarchs, the prophets, in general all the just, before the new dispensation, were detained so it has been generally believed (though only by inference from some vague utterances in Scripture) in a preparatory abode, which the Fathers call by the name *Limbus Patrum*, awaiting the final coming of the common Redeemer. The general belief of Christians has been, that since the ascension of Christ, the just who are free from sin are admitted into heaven immediately after death. More than one controversy, however, has arisen on the subject; the most important of which are the Millenarian controversy (see MILLENNIUM), the Origenistic (see ORIGEN), and and that on the question whether the just are admitted to the beatific vision of God immediately after death, or only after the general resurrection. The latter controversy arose out of the question as to the nature of the happiness of heaven, a discussion out of place here. It has been suggested that not all among the just are necessarily to be thought of as admitted instantly to heaven at death, or on the other hand as all alike detained and waiting for some fixed future period; but that it is conceivable that each enters earlier or later according to the completion of his readiness for the heavenly state: this seems to harmonize various scriptural utterances on this subject. Such conjectures, however, cannot be held as established doctrines. The Koran adopts the Cabalistic notion of seven heavens, which rise each above the other like the stages of a building; and it places the happiness of heaven in the enjoyment of sense. The Cabalistic writers, entangled in materialistic thought, divide these seven heavens according to the successive degrees of glory which they imply. The seventh is the abode of God and of the highest class of angels; the sixth, fifth, fourth, and third, are the successive abodes of the various grades of angels, arranged according to the degrees of dignity. The second is the region of the clouds, and the first the space between the clouds and the earth. One of the apocryphal books of the fifth c., *The Testament of the Twelve Patriarchs*, contains a curious exposition of the same notion.

HEAVY, a. *hĕv'ĭ* [AS. *hefig;* Icel. *hofugr*, heavy—from

Icel. *hefja*, to heave]: weighty; ponderous; laborious; dejected; depressed; dark; drowsy; not light or spongy; large; abundant; indigestible; dull or tedious, as a speech or discourse; soft or miry, as heavy land; loud, as heavy firing: AD. common as the first element of a compound; heavily, as in *heavy*-laden, *heavy*-hearted. HEAV'ILY, ad. *-lĭ*. HEAV'INESS, n. quality of being heavy; weight. HEAVY-SPAR, a mineral, the name given to sulphate of baryta in consequence of its great specific gravity.—SYN. of 'heavy, a.': sorrowful; slow; grievous; oppressive; afflictive; dull; torpid; indolent; lazy; stupid; foolish; troublesome; tedious; burthensome; loaded; encumbered; thick; cloudy; gloomy; dark; pregnant; cumbersome; leaden; burdened; sluggish; dilatory; inactive; lifeless; inanimate; strong; violent; forcible; low; deep; clammy; solid; cloggy; clayey.

HEAVYSEGE, CHARLES: b. Liverpool, Eng., 1816; d. 1876. He came to Canada in 1853 and struggled against adverse financial circumstances as a newspaper reporter. His works include: *Saul: A Scriptural Tragedy* (1857); *Count Filippo: or the unequal Marriage* (1860); *Jephthah's Daughter: a Drama* (1865); *The Advocate: A Novel* (1865).

HEBBEL, *hĕb'bl*, FRIEDRICH: lyrical and dramatic poet of Germany: 1813, Mar. 18—1863; b. Wesselburen, in Ditmarsh, duchy of Holstein, Denmark. He studied at Heidelberg and Munich; and after travelling in France and Italy, settled at Vienna, where he married the actress Christine Enghaus 1846. His principal works are *Gedichte* (2 vols. Hamb. 1842; Leip. 1848), remarkable for melody and beauty; and several dramas. Hebbel had rich imagination, great power of thought, and an energetic and original style, but too great predilection for the horrible and the exaggerated. His collected works appeared 1865-68.—See Biography by Kuh (1877).

HEBDOMADAL, a. *hĕb-dŏm'ă-dăl* [Gr. *hebdŏmăs*, the space of seven days—from *hepta*, seven: *hebdŏmădă*, a week]: weekly; consisting of seven days, or occurring every seven days; also in same sense, HEB'DOMAT'ICAL, a. *-ĭ-kăl*. HEBDOM'ADARY, n. *-dĕr-ĭ*, in a *convent*, an inmate officiating in turn for a week: ADJ. weekly. HEBDOMADAL COUNCIL, part of the governing body at Oxford.

HEBE, n. *hē'bē* [Gr. *Hebē*]: in the *anc. myth.*, the goddess of youth; daughter of Zeus and Here—according to others, of Here alone—was the wife of Hercules after he had been deified. She was the cupbearer in Olympus, before Zeus conferred that office upon Ganymede (q.v.); but she always retained the power of restoring the aged to the bloom of youth and beauty. According to Apollodorus, she became mother of two sons by Hercules—Alexiares and Aniketos; but in Homer she appears always as a virgin. In Athens, altars were erected to her conjointly with Hercules. In Rome, she was worshipped under the name Juventas, and a temple in her honor stood on the Capitoline Hill at the time of Servius Tullius. Statues of

Hebe are extremely rare; she is to be recognized only by the drinking-cup.—*Hebe*, in astron., is the name of one of the planetoids.

HEBEN, n. *hĕb′ĕn:* in *OE.*, for EBONY, which see,

HEBENON, n. *hĕb′ĕ-nŏn:* in *OE.*, a supposed corruption of *heben*, or ebony, whose juice was considered poisonous; also said to be *henbane*, or the poisonous crude oil of tobacco.

HEBER, *hē′bėr*, REGINALD: second bishop of Calcutta, and an English poet: 1783, Apr. 21—1826, Apr. 3; b. Malpas, Cheshire. In 1800, he entered at Brasenose College, Oxford; and three years later produced his prize-poem *Palestine*, the only prize-poem perhaps which holds a place in English literature. In 1804, he became a fellow of All Souls. In 1807, he was inducted into the family-living at Hodnet, and entered upon his parochial duties with great zeal. He was a frequent contributor to the *Quarterly Review*, his political views being those of a tory and high churchman. He held to the doctrine of apostolical succession, yet was of a liberal Christian spirit. In 1812, he published a volume of *Hymns*. He was appointed Bampton lecturer 1815, and two years afterward he received a stall in St. Asaph Cathedral. He edited the works of Jeremy Taylor 1819, and was elected preacher of Lincoln's Inn 1822. Shortly afterward, the vacant see of Calcutta was offered to him, and after much hesitation on account of his wife and child, it was accepted, and he embarked for India 1823, June 16. He entered on his duties wth exemplary zeal; and 1824, June, he began the visitation of his diocese. He spent about 11 months visiting stations in Upper Bengal and the north of Bombay. 1825, Apr.—Aug., he remained at Bombay, and sailed thence to Calcutta, where he arrived Oct. 21. In 1826, Feb., he proceeded to Madras on a visit to the southern province. He reached Trichinopoly Apr. 1, and on the 3d, after confirming 15 natives, he entered a cold bath, in which, half an hour afterward, he was found dead. The journal which he kept during his tour of visitation was originally published in three octavo vols., and afterward reprinted in two vols., in Murray's *Home and Colonial Library*. His life was published by his widow, two vols., (Lond. 1830). As a poet, his fame rests upon *Palestine* and his *Hymns* (new edit., Murray 1869). They have not great originality or depth, but they are pleasingly versified, and illuminated by graceful fancy. He is remembered for his hymns, such as, *Brightest and best of the sons of the morning, By cool Siloam's shady rill, Lo! He comes in clouds descending, Jesus Christ is risen to-day, Holy, Holy, Holy, Lord God Almighty, From Greenland's icy mountains.* As the most learned and zealous of Indian bishops, he is enshrined in the affections of the Christian world. RICHARD HEBER, half-brother of Reginald Heber, 1773–1833, b. Westminster, was a famous bibliomaniac. Having succeeded to large estates by the death of his father 1804, he was

enabled to indulge his elegant hobby to the utmost. Dr. Dibdin estimated his collection in England at 105,000 vols., in addition to which he possessed many thousands of books on the continent, the whole having cost him £180,000.

HÉBERT, *ā-bär'*, Jacques Rene; commonly known as *Père Duchesne:* 1755—1794, Mar. 24; b. Alençon: one of the most profligate characters of the French Revolution. At an early age, he went to Paris, and became a servant in one of the small theatres, but was dismissed for embezzling money. He then entered the service of a physician, but was soon dismissed for the same fault. At the commencement of the Revolution, a person of the name of Lemaire, under the title of *Le Père Duchesne*, published a small popular paper for the diffusion of constitutional principles among the people. The success of this paper induced the Jacobins to establish another of the same name, and Hébert was appointed editor; and knowing the tastes of the class of people that he addressed, he displayed such an exaggeration of principles and cynicism of language as ruined the enterprise of his honest rival. In consequence of the events of Aug. 10, he became a member of the revolutionary council, and was conspicuous in the horrors of September. He and his associates called Hébertists or *Enragés*, were likewise mainly instrumental in converting the church of Notre Dame into a temple of the goddess 'Reason,' whose worship he invented. He was at length compelled to give way before the faction of Robespierre, and perished on the scaffold.

HÉRBERT, Louis Philippe, Canadian sculptor: b. Sainte Sophie d'Halifax, Quebec, 1850, Jan. 27. He studied for several years in Canada, and later in Paris, where he established his studio. In 1894 he won the Confederation medal awarded by the Canadian government. Among his works are historical subjects executed for public buildings in Quebec, Ottawa, and Montreal.

HEBETE, a. *hĕb'ēt* [L. *hĕbĕs*, or *hĕbĕtem*, dull, blunt: F. *hébété*, stupid]: in *OE.*, dull; stupid; doltish: N. a dull, sluggish, obtuse person. Hebetude, n. *hĕb'ĕ-tūd*, dulness; stupidity; obtuseness.

HEBREW, n. *hē'brô*. [L. *Hebræus;* Gr. *Hebraios;* F. *Hébreu*, of or belonging to the Hebrews, Hebrew—supposed to be derived from *Eber* or *Heber*, great grandson of Shem, and an ancestor of Abraham; or, derived from *Abraham*, who may have been so called after he crossed the Euphrates—from Heb. *'abar*, he crossed over—see Skeat]: a descendant of Eber or Heber—particularly of Jacob; a Jew; an Israelite; the language of the Jews. Adj. of or pertaining to Hebrews or Jews. Hebraic, a. *hē-brā'ĭk*, of or relating to the Hebrews or the language. Hebra'ically, ad. *-kăl-lĭ*, after the manner of the Hebrew language. Hebraicize, v. *hē-brā'ĭ-sīz*, to make or convert into Hebrew. Hebra'icizing, imp. Hebra'icized, pp. *ĭ-sīzd*. Hebraize, v. *hē'brā-īz*, same sense as *hebraicise*. He'brai'zing, imp. *-ī'zĭng*. He'braized, pp. *-īzd*. Hebraism, n. *-ĭzm*, He-

brew idiom; an expression or manner of speaking peculiar to the Hebrew language. He'braist, n. *-ĭst*, one versed in Hebrew. He'brais'tic, a. *-tĭk*, pertaining to or resembling Hebrew.—*Hebrews* is the distinctive name of that branch of the Semitic family which migrated from Mesopotamia into Palestine, thence went to Egypt, and, after a long period of bondage, reconquered Palestine, and finally settled there. Divided, at a later period, into two distinct states, that of Judah and of Israel, they were singly overcome, and led into exile. A portion, chiefly descendants of Judah (Jehudah), returned, and founded a new empire. From that time all the members of the Mosaic commonwealth were known by the name of Jehudim, corrupted into Jews. For a continuous sketch of their entire history from the days of Abraham to our own, as well as a brief outline of their language and literature, see Jews.

HEBREW LANGUAGE AND LITERATURE: the tongue in which the ancient Jews spoke and wrote, and the books produced by that people during their settlement in Palestine as an independent nation; these latter constitute the Hebrew Scriptures and are looked upon by the Hebrews as containing the inspired word of God. It is impossible not to include in Hebrew literature the immense volume of rabbinical writings produced after the conquest of the Romans and the subsequent dispersion of the Jews. The destruction of Jerusalem deprived the Israelites of the temple worship, and practically abolished the institution of sacrifice. Hence the importance to them of that literature of the dispersion which did so much in preserving to them their national unity and exclusiveness, and keeping alive the flame of race enthusiasm, amid the new circumstances of their national life as the chosen people.

The Hebrew Language.—The Hebrew tongue belongs to the Semitic family of languages in which are included the Arabic, the Ethiopic, Babylonic and Chaldic. It is one of the finest, most copious and elastic of this group, and indeed is only inferior in richness and development to the Arabic. It is, however, surpassed by Indo-Germanic dialects such as Greek and Latin, in point of precision, as its want of accidence, in its uninflected nouns and verbs, sometimes leads to confusion and obscurity.

The alphabet is composed of 22 letters, all consonants, the vowel values being expressed by points of which there are about 40. These are placed above or below the letters they syllabicate. The system of vowel points was introduced in the 6th or 7th century by the school of Tiberias when the Masora (q.v.), was first committed to writing. There are no capital letters. The writing is from right to left. There are three kinds of Hebrew alphabet now in use—the square or Assyrian (properly called the Babylonian), which is generally supposed to have been introduced by Ezra, the most common in print; the rabbinical, or mediæval, used chiefly in commentaries and notes; and the cursive, in writing.

The Hebrew etymological roots are triliteral, to reckon

by consonants. From these roots words are formed by suffixes or prefixes. One of the most remarkable characteristics of the Hebrew language is its apparent fixity of form. After it has been in use for upward of a thousand years there is little variation to be seen in the idiom, vocabulary or literature of its monuments. This has led some critics to dispute the traditional antiquity of the Pentateuch. There is very much less variation from the style of the books of Moses to be found in the latest of the Scriptures than is met with in an English writer of to-day when compared with a writer of the Restoration period. But this may perhaps be explained by the fact that the early Scriptures fixed once for all the Hebrew tongue, which was not allowed to develop or deviate from the standard of a grammar, vocabulary and idiom which were alike inspired of God. The Chinese language furnishes a parallel instance of immutability. The Arabic of the present day is very much the same as in the days of Mohammed, who gave it the form it bears in the Koran, and the Hadiths which supplemented it in subsequent centuries.

Hebrew Literature.—The Hebrew writings cover a wide area, whether we consider their literary form as comprising a cosmogony or treatise of primitive science, verses of moral treatises, including a code of civil law, history, poetry, in the form of lyric, drama, and ode; or the time they cover from Moses to Ezra; or the peoples they deal with which include all the ancient monarchies of Western Asia, as well as the most illustrious of Pharaonic dynasties. The ancient books give us a wonderful picture of the pastoral life of the early patriarchs. Tales and poems, items of daily contemporaneous incident abound in them. Poetry among the Hebrews as among all other ancient is earlier than prose, and a vein of lyric feelings runs through the Jewish records from the first chapter of Genesis to the Song of the Well in Numbers, and the ode of Deborah and Barak, in Judges. There is the fable of Jotham, and the riddle of Samson. The variety which characterizes even the books of Moses is inexhaustible, But those, such as Joshua, which have been called the Book of the Wars of Jehovah, and the Book of Proverbs, show a still deeper and more prolific vitality in literary and religious ideas. In the age of Samuel there was a new department of literature inaugurated under the influence of religious conviction and emotion. The schools of the prophets favored the cultivation and development of a species of poetry of which the world had never seen the like, and has never yet since equaled. The prophets were poets who stood between Jehovah and his people, interpreting his will, in strains of alternate consolation and rebuke; in words of warning, rebuke, prediction and condemnation. It was in these schools that David learned to be what he styled himself, the sweet singer of Israel. He indeed was the greatest of a line of psalmists, which includes Asaph and the Sons of Korah. His son Solomon became the philo-

sophic moralist of his people, and was as famous for gnomic utterances as his father had been for his psalms. The love idyll followed, and the century of the Hebrew monarchy saw also the rise of Hebrew historic literature.

It is easy to classify the Hebrew literature, which naturally divides itself into origins, legislation, prophecy history, lyric, proverbs, and moral poetry. The origins and legislation are included in the Pentateuch or five books of Moses, and give us the history of Israel's beginning, and settlement in the holy land. As a sequel to this we have the history of the kings, completed by Ezra. Prophecy as represented by Samuel, Nathan, and Gad, Elijah and Elisha had always existed through the monarchical period, but it reached its highest literary development, in proportion as the national spirit of religion declined, and the days of exile and dispersion grew nearer. The form the written prophecy takes is that of a rhetorical lyric, frequently a passionate improvisation which often rises in eloquence and power to the pitch of sublimity. Even history sometimes takes the shape of a poetic tale, sometimes of a mere traditional record of events. The early historical books take their tone and color from that of Genesis; the type of the later historian is the book of Samuel and Kings. An appendix to these is furnished by Ezra and Nehemiah. Hebrew poetry is quite different from that of Europe. It is neither the artful arrangement of repeated syllabic metre, like that of Greece and Rome, nor the music of terminal rhymes, like the romantic poetry of the Latin and Teutonic races. It is a wonderful system of strophic parallelisms. This system is shown in its simplest form in the proverbs of Solomon, and revived in the Greek writings of Jesus the son of Sirach. The book of Job excels both of these works in poetic intensity,and wide spiritual sweep. It is largely dramatic in form; occasional lyrical passages occur, while it has an epic prologue and epilogue, that is, the introduction and dénouement have all the direct stateliness of the epic poem. Indeed the foundation of Hebrew poetry is laid in the lyric, and the genius of the national literature are to be looked for in those psalms which were current from the time of David to the Maccabees. The Song of Solomon is a collection of love lyrics, tender and passionate, but more gorgeous and tinged with deeper melancholy than those of the Greek or Persian muse; the village tale of Ruth belongs to the days of pastoral Israel; the novelette of Esther can scarcely claim a place in religious literature; the lamentations of Jeremiah are elegies uttered over the coming downfall of Israel, and the words of the preacher, in Ecclesiastes, which belongs to the Alexandrian periods, are laments over the decline of the people in religious idealism and social virtue. After their return from captivity, the Jewish, or as it is often called, rabbinical literature, grew and flourished with new life. Under the guidance of Ezra the sacred books were collected, authenticated, and arranged into a canon. The Pentateuch was

publicly read, taught in schools, explained, and translated into the Aramaic or Chaldee dialect. The traditions explanatory or complementary to the law of Moses were traced through the prophets and elders to that law-giver, and established as authoritative and binding. They were compiled so as to form what was styled Midrash, divided into the Halacha and the Haggada: the former considered the improvement of the law with a view to practical results; the latter the essence of the religious and historical. To the Maccabean era belong the Apocrypha, various Greek versions of the Bible, and collections of prayers, poems, and proverbs. Following the destruction of Jerusalem (70 A.D.) came the completion of the New Testament, the historical works of Josephus, and various spurious Gospels, all written in the Greek language. On being driven from their capital the Jews founded numerous schools in which their language and literature were taught. The Mishna, which contains traditions and interpretations of the Scriptures, is supposed to have been compiled in the second or third century of our era. The Mishna was considered one of the principal works of Hebrew literature, and the rabbis of Tiberias and Babylon wrote numerous commentaries on it. These were collected into two works, and entitled the Jerusalem and the Babylonian Talmuds. The Jerusalem Talmud was completed about the end of the 4th century; the Babylonian Talmud about a century later. The most brilliant era of modern Jewish literature is that of Moorish Spain. Treated by the conquerors of the Peninsula with mildness, the Jews turned to the culture of science and literature, and soon found themselves at the head of the intellectual world, not excepting the Arabs, whose culture is a subject of admiration among all historians. No science was neglected by the Israelites; astronomy, geography, philosophy, medicine, history, poetry, music, the Spanish rabbis knew and taught, The Jewish school of Toledo was the most renowned of all the schools in the Peninsula. This is the era of the great Moses ben Maimon (Maimonides), the illustrious disciple of Averroes; of the poet and philologist Aben-Ezra; of Kimchi, of Isaac Ben Sid, etc. The celebrated Academy of Lisbon flourished under Jewish auspices to the end of the 15th century. After their expulsion from Spain, the Jews founded those printing establishments from which issued a great number of works in Hebrew. The 17th century was more fatal to Judaism than even the centuries of persecution. It was the age of Spinoza, the pantheist. But even before his day the Hebrew language had been falling into disuse. In Germany many of the writers of the 18th and 19th centuries were Jews or of Jewish extraction, and are among the brightest names in literature. Moses Mendelssohn, the philosopher; Neander, Heinrich Heine, Berthold Auerbach, Herz, Börne have added much to the literary glory of their age; Disraeli, father and son, Zangwill, Emma Lazarus, are names which will occur to book-lovers of a younger generation.

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HEBREWS. See JEWS.

HEBREWS, EPISTLE TO THE: one of the Epistles of the New Testament. Much discussion has arisen both as to its *canonicity* and as to its *authorship*, the absence of the customary superscription rendering it impossible to attain certainty in regard to the latter, and tending to throw doubt on the former also. In reference to the first and more important of these points, the canonicity, the case stands as follows: The earliest post-apostolic writer, Clemens Romanus, quotes from it in the same way as from the other, books admittedly canonical. Justin Martyr, Pinytus (?), the Cretan bishop, the predecessors of Clemens Alexandrinus and Origen, and the framers of the Peshito version of the New Testament, accept it as authoritative; while the Gnostic heretics, Basilides and Marcion, are spoken of as distinctly rejecting it. No disbelief of its canonicity is expressed by any section of the orthodox church until after the middle of the 2d c.—though many writers are silent altogether about it—after which period, for the next two centuries, the Roman and n. African churches reject its authority. Tertullian speaks of it as a good sort of apocryphal book; Cyprian does not include it in Paul's epistles; Irenænus, even while defending the divinity of Christ, declines to strengthen his argument, which he could very effectively have done, by borrowing armor from its stores; while the Muratorian Fragment on the Canon, Caius, Hippolytus, and Victorinus of Pannonia, also leave it out of the Pauline epistles. During the 4th c., however, its authority began to revive, and it was received by Hilary of Poitiers, Ambrose of Milan, and later by Jerome, who, though frequently too hasty in his conclusions, was certainly the most learned and accomplished of the Latin Fathers. The immense authority of Augustine was thrown into the same scale; others soon followed, and in 416, a decretal of Pope Innocent III. placed its canonicity beyond cavil. In modern times, Cardinal Cajetan, opponent of Luther, reopened the ancient controversy. He rejected the authority of the epistle. The great reformer did the same, affirming that it was the work of some disciple of Paul's, who had not been thoroughly grounded in his master's teaching, and had built his own 'wood, hay, and stubble,' upon the apostle's 'gold, silver, and precious stones.' This opinion, however, met with small approval, and has never been adopted by any Protestant church.—*Authorship.* This is unknown, but was commonly ascribed to the apostle Paul. This appears to

have been the opinion of the Eastern church from the first; but the Alexandrian Fathers—most critical and scholarly of the early Christian theologians—struck with the entire dissimilarity of style, phraseology, and mode of thought which it presents to the Pauline epistles, and which is abundantly manifest even in the English version, sought to fix its authorship on some other person, Luke being the favorite. Tertullian, again, states that according to the traditional belief of the n. African school, Barnabas was the author. The Catholic Church, down to the middle of the 4th c., contented itself with a negative position, denying its Pauline authorship. The opinion of the Alexandrian school may be said to have prevailed, viz., that though Pauline in essence, the epistle was not Pauline in form. Thus the matter remained till the time of Luther, who suggested Apollos as the likeliest author. Since then, the great majority of scholars, including many of the orthodox, have denied the Pauline authorship.

Who were the 'Hebrews' to whom the epistle was sent, is also a matter of doubt; but the personality is very strongly on the side of the church at Jerusalem, composed of those who were 'Hebrews of the Hebrews.' The date of the epistle can only be inferred from its contents. It has long been held that its date must have been *before* the destruction of Jerusalem (A.D. 70), because the overthrow of the temple is not alluded to, which would have been one of the strongest links in the chain of argument to prove the temporary nature of the old national faith. This inference is no longer regarded as certain: the Rabbinical writings furnish parallel instances in which such an inference is plainly inadmissible; and recent scholars are not insisting on so early a date for the epistle.

The purpose of the writer of the epistle is apparently to encourage the Jewish Christians of Jerusalem—perhaps of all Palestine—to persevere in the confession of their Christian faith, against the constant temptation to return to their hallowed ancestral Judaism. The writer opens the whole question of Judaism *versus* Christianity; exhibits the contrast between the two with sharp analysis, strips the former of all its accidental and superstitious attractions, and shows that what is really deep and valuable in it is its *prophetic* character; it is but the shadow of a 'better hope,' viz., 'the hope of the Gospel;' and the great fathers and heroes of Judaism from Apel downward, illustrate the truth of this, for 'these all died in faith, not having received the promises, but having seen them afar off.' Yet so vital and strong had been the faith of the fathers, that it may almost be said to have put them in spiritual possession of the realities to which they looked forward, for 'faith is the *substance* of things hoped for, the *evidence* of things not seen.' Thus they were 'Christians before Christianity,' and now that the things which they hoped for had come, the Jewish believers ought not to be grieved at parting with the old national worship, however dear, for the new worship really embraced the substance of the old, and thus

bestowed upon it its own immortality. The style of the epistle in several passages is richly rhetorical.

HEBRIDES, *hĕb′rĭ-dēz:* in a general sense all the islands on the w. coast of Scotland. They have been variously classified; but the most natural division seems to be into the Outer and Inner Hebrides. To the Outer belong Lewis, with Harris, North Uist, Benbecula, South Uist, Barra, Coll, and Tiree. The remote isle of St. Kilda might be associated with this external series. The principal of the Inner islands are Skye, Eigg, Mull, Iona, Staffa, Ulva, Lismore, Kerrera, Easdale, Colonsay, Jura, and Islay. Bute, the Combraes, and Arran, though in the Firth of Clyde, are usually classed with the Hebrides. The whole are popularly spoken of as the Western Isles, the term Hebrides being confined chiefly to literature. The total number of the Hebrides is about 490 (which number includes every islet that affords sufficient pasturage to support one sheep); of these not more than 120 are inhabited. The entire area is not accurately known, but is estimated at more than 3,000 sq. m. Only about 200,000 acres are arable, the rest is in pasture-land of little value, and in morasses, peat-mosses, lakes, and barren sands and rocks. Pop. about 80,000.

There is comparatively little wood in the Hebrides, and on many of the islands none at all. In Lewis, Skye, Islay, Mull, and several of the other islands, however, both forest and fruit trees have been planted to a considerable extent, with great success. Oats and barley are almost the only cereal crops raised. Potatoes are extensively cultivated. Cattle constitute the staple product. The native breed are small but handsome. Cheese and butter of good quality are produced. The breed of horses is also small, but hardy and docile. The native breed of sheep is very small but Cheviots have been introduced with success. The productive land is partly occupied as sheep-farms; much of it is held by 'crofters', who occupy holdings usually of a very few acres, sometimes with a right of pasturage in common attached. There are also 'cotters' who occupy houses, with or without a patch of ground, on the land of the crofter, the farmer, or the landlord, and who are often mere squatters paying no rent. Grouse-moors and deer ranges cover a considerable area. Owing to the minute division of the arable land there is in many places an excess of population. The condition of the crofters and cotters, especially in the Outer Hebrides and Skye, is very depressed, their dwellings miserable, and their living poor, consisting chiefly of potatoes, milk, and oat or barley bread, and in bad harvests it is often insufficient in quantity. The fisheries are not developed to the extent they might be. Whiskey is manufactured in Skye, Islay, and Mull.

The scenery of Skye is grand and picturesque; Mull is noted for lofty mountains, Jura for its peaks, and Arran for high rugged hills. Islay and Bute are comparatively level and arable. Staffa is remarkable for its basaltic columns and great cavern. Iona is interesting from its ruins

and historical associations. Politically, all the Hebridean isles are attached to Scotland, in whose civil and ecclesiastical systems they participate. The counties among which they are distributed are Ross, Inverness, Argyle, and Bute. The principal Hebridean towns are Stornoway in Lewis, Portree in Skye, Tobermory in Mull, and Rothesay in Bute. Oban, though on the mainland of Argyle, is usually considered a town of the Hebrides, and with Rothesay, is best known to tourists.

Through the influence of the Gulf Stream (q.v.), the climate of the Hebrides is peculiarly mild. Snow seldom lies long on the sea-shores or low grounds, and in sheltered spots, tender plants are not nipped by winter frosts. But, though genial, the climate is humid. Drizzling rains are frequent, and mists often envelop the islands, or at least shroud the higher mountains from sight. With these drawbacks, the climate is pleasant and healthful, and is recommended for certain classes of invalids. The humbler classes of natives, partaking of the old Celtic character, for the most part speak Gaelic, but latterly, through educational efforts and otherwise, English has made extensive progress. As in the main-laid portion of the Highlands, many large estates have passed from old families of note into the hands of opulent modern proprietors, who have made extensive improvements. The greatest improvement of all, however, was the work of a Glasgow firm, David Hutcheson & Co., by whom was established an extraordinary system of steam-navigation in connection with the Hebrides, calculated to develop the resources of the islands, and bring them, with the neighboring coast, within the sphere of trade and the reach of tourists. As opening remote tracts formerly reached only with extreme difficulty, the system of Hebridean steamers may be said to be gradually altering the character of, and giving a new value to, the Western Highlands and Islands. The opening of a railway from Dingwall to Strome Ferry, opposite Skye, and of the line from Callander to Oban, 1880, has further greatly increased the accessibility of these regions.

The Hebrides are the *Ebudæ* of Ptolemy, the *Hebudes* (of which the name Hebrides is merely a corruption, said to be the consequence of a misprint in a Parisian printing-office) of Pliny, and the *Sudreyjar* (Southern Islands, as distinguished from *Orkneyjar*, Northern Islands) of thedNorwegians. The latter epithet was Latinized into Sodorenses, and is still retained in the title 'Bishop of Sodor and Man.' The history of these islands forms an interesting episode in that of Scotland. According to the general account, the Hebrides were colonized first in the beginning of the 9th c. by emigrants from Norway, who had fled from the iron rule of Harald Haarfager (863–936); they naturally settled in the greatest numbers on the first land that was reached, viz., the Shetland and Orkney Isles and Outer Hebrides; but some wandered as far s. as the Isle of Man, colonizing as they went. The consequence was the total absorption of

the Celtic into the Norse element in the northern islands, while southward the Celtic element asserted the predominance. This colony after a time threw off swarms, which settled on the n. and w. coasts of Scotland, Cumberland, and Westmoreland, and in all probability founded the Norwegian kingdoms of Dublin, Waterford, and Limerick; it also sent a colony to Iceland 874. At last the settlers became so powerful as to be a source of annoyance to the mother-country, whereupon Harald Haarfager, about 870, fitted out a great expedition, and subdued the Hebrides and Man. They remained subject to Norway till 1266, three years after the battle of Largs, and were then transferred to Scotland. In 1346, one of the chiefs, named Macdonald, reduced the whole under his authority, and took the title 'Lord of the Isles;' but 1540 they were finally annexed to the Scottish crown by James V. The Hebrides were ecclesiastically dependent on Norway as late as 1374, and Prof. Munch argues that this relation lasted till 1472, when St. Andrews was made the seat of a metropolitan. The influx of the Norsemen had had here, as elsewhere, great influence over the nomenclature; many places and islands having lost their original Celtic designations.

There are numerous works on the Hebrides, many by well-qualified observers. The more notable are Martin's *Description*; Pennant's *Tour;* Dr. Johnson's *Journey to the Western Islands*, and Boswell's account of the same tour; Gregory's *History;* Macculloch's *Description* (1819); and Buchanan's *Hebrid Isles* (1883). For the ancient history see Munch's *Chronica Regum Manniæ et Insularum*. Scott's *Lord of the Isles* raised a popular interest in these islands and they are now largely visited by tourists in summer time. For the more important islands, see the separate titles.

HEB'RIDES, New. See New Hebrides.

HEBRIDIAN, a. *hĕb-rĭd'ĭ-ăn:* pertaining to the Hebrides, *hĕb'rĭ-dēz*, a group of islands on the west coast of Scotland: N. an inhabitant of.

HEBRON, *hē'bron:* one of the oldest cities in Palestine; belonging to the tribe of Judah, 21 m. s. s.w. of Jerusalem; may even be regarded as one of the oldest in the world, for it was in existence in the time of Abraham, nearly 2,000 years before Christ; 'built seven years before Zoan (Tanis) in Egypt' (Num. xiii. 22). Hebron was anciently called Kirjatharba, i.e., city of Arba, from the progenitor of the *Anakim* (q.v.); at a later period, it was the residence of King David, before he conquered Jerusalem; its subsequent history is unimportant, the modern town is a poor place, inhabited by some 18,000 people. It lies low in a narrow and picturesque valley—the valley of Eschol, famous now, as of old, for its thick clustering grapes, its olives, and other fruits. The church erected by Empress Helena, mother of Constantine, on the spot where Abraham is said to have been buried, has been converted into a mosque called *El Haram*. The modern name of the town

is *El-Khulîl* ('the friend,' i.e., of God), in allusion to Abraham.

HE'BRUS. See MARITZA.

HECATÆUS, *hĕk-a-tē'ŭs:* famous historian and geographer: probably abt. B.C. 550—B.C. 476 (though the dates are uncertain); son of Hegesander. He belonged to an ancient and wealthy family of Miletus, and was enabled to gratify his natural passion for knowledge and travel. He seems to have visited Greece, Thrace, the countries bordering on the Euxine, and many provinces of the Persian empire, with parts of Italy, Spain, and Africa. The results of his foreign travels and of his private studies were embodied in two great works—*Tour of the World* and *Histories* or *Genealogies*. His geographical work was into two great portions, one treating of Europe, the other of Asia, Egypt, and Libya. He improved the map of the world which had been made by Anaximander. His *Histories* was little more than a prose version of the poetical legends of the Greeks—about Deucalion and his descendants—Heracles and the Heraclidæ—the Peloponnesian traditions—and those of Asia. Herodotus seems to have set considerable value on the writings of Hecatæus. The fragments of the works of Hecatæus have been edited by Creuzer, Klausen, and others.

The most interesting part of the life of Hecatæus is that which succeeded his travels. In the revolt of the Ionians against Persia, his extensive knowledge of the Persian empire and its resources enabled him to give sound advice to Aristagoras, leader of the insurrection, which, however, was rejected. He dissuaded his countrymen from an attempt so far above their means; when that counsel was despised he urged the formation of a fleet, but without effect. After defeat had humbled the Ionians, and Aristagoras with others, contemplated ight to Sardinia, he urged them (though in vain) to fortify the island of Leros and wait there the course of events. He afterward went as ambassador to the Persian satrap Artaphernes, and induced him to treat the Ionians with leniency.

HECATE, *hĕk'ă-tē:* ancient Thracian goddess, afterward adopted into the Greek Pantheon; mentioned first by Hesiod who calls her the daughter of the Titan Perses, and Asteria, or Night. She was the only one of the Titans, under the rule of Zena, who retained her former power. Hecate was in some sense a triple deity, ruling in heaven, earth, and the infernal (or lower world—Phœbe or the Moon in heaven, Diana on the earth, and Hecate or Proserpine in hades). She appears on some occasions as the bestower of wealth, victory, wisdom, good-luck to sailors and hunters, and prosperity to youth, but able also to withhold these blessings. In connection with Persephone, she is described as a powerful infernal and cruel deity, who has all the magic powers of heaven, earth, and sea at her command. Particular honors were paid to her in Bœotia, at Ægina, and even in the Eleusinian mysteries.

She played an important part in the mysteries of the Cabiri, celebrated principally at Samothrace and Lemnos. Her sanctuary in Samothrace was the Zerynthian Cave, and wherever she was worshipped with the Cabiri, her temple was placed near a cave. As an infernal goddess, she appears in a hideous form. Serpents issue from her feet, serpents are twined in her hair, she bears a lighted torch and a sword in her hand, and two black shaggy dogs are her attendants; and sometimes she is represented with three heads, viz., those of a horse, a lion, and a dog. In this last form, she appears at the crossways.

HECATOMB, n. *hĕk'ă-tôm* [Gr. *hekatŏmbē*—from *hekaton*, a hundred; *bous*, an ox; F. *hécatombe:* L. *hecatom'bē*]: in the worship of the Greeks, and in other ancient religions, a sacrifice of a large number of victims, properly, though not necessarily, one hundred. Originally, it seems that the practice was to burn the entire victim; but even as early as the time of Homer, it was usual to burn only the legs wrapped up in the fat and certain parts of the intestines: the rest of the victim was consumed at the festive meal which succeeded the sacrifice. Not only were the gods believed to be propitiated in proportion to the number of victims, but the increase of the number was gratifying also to the priests and servants of the temple, and to the public who were admitted to the sacrificial banquet. Hence in Athens the hecatomb was a most popular form of sacrifice (Athenæus, i. p. 3). On the contrary, the thrifty Spartans limited the number both of the victims and of the sacrifices; and while the other Greek states required that the victim should be of the most perfect kind, the Shartans were content with animals of inferior character.

HECK, n. *hĕk*, or HACK, n. *hăk* [Dut. *heck*, a grating: Sw. *hack*, a hedge of branches]: an instrument for catching fish; a bend in a stream; a rack for holding fodder: see HECKLE. HECK AND MANGER [*heck*, the rack: *manger*, the feeding-trough]: in *Scot.*, to live comfortably at free quarters; to live in plenty and luxury without regard to consequences.

HECK, *hĕk*, BARBARA: prob. abt. 1734–1804; b. Ballingarry, Ireland; of a German family that had settled in that region; a founder of American Methodism. She married Paul Heck, was converted to Methodism by Wesley's preaching, accompanied Philip Embury to New York 1760, gathered a congregation, and stimulated Embury and his associates to build the John street meeting-house. When Wesley took charge of the chapel she went with Embury to Salem, N. Y., and founded the first Meth. soc. in n. N. Y., and subsequently founded the first soc. in Canada, near Augusta, where she died.

HECKER, *hĕk'ker*, FRIEDRICH KARL FRANZ: 1811, Sep. 28—1881, Mar. 24; b. Eichtersheim, Baden: leader of the democratic party in the German revolution of 1848. After studying law in Heidelberg, became 1838 advocate of the supreme court in Manheim. Though rising to eminence as

a pleader, when elected 1842 a member of the second chamber in Baden, he abandoned his profession for political life, and soon grew popular among the more advanced of the opposition. In 1846 he began to side actively with the purely democratic and socialistic party outside of the chamber, and on the revolution breaking out 1848, immediately began to employ his eloquence in revolutionary agitation. When the preliminary convention (*Das Vorparlament*) met, he endeavored, with the influence of his whole party, to constitute it into a permanent republican assembly. The frustration of this effort led him to think of surprising the smaller governments of s. Germany with the artisan bands which had been sent to the Rhine. Defeated at Kandern, 1849, Apr. 20, he fled into the canton of Basel, where he conducted a newspaper against the constitutional party. On being refused admission into the parliament, though elected, he emigrated to America, and bought a farm near Belleville, Illinois. He commanded a brigade on the federal side in the civil war, and died at St. Louis.

HECKER, *hĕk'ĕr*, Isaac Thomas: 1819, Dec. 18—1888, Dec. 22; b. New York: founder of the Rom. Cath. congregation of Paulists. He was engaged some years in the flour business with his brothers, joined the Brook Farm community 1843, became a student of Kant and Fourier, spent some time with the Fruitlands community and with Henry D. Thoreau in his 'hermitage,' became a Rom. Cath. 1845, joined the Redemptorist order in Belgium 1847, was ordained priest by Cardinal Wiseman, London, 1851; released from the Redemptorists by the pope 1857, and founded the congregation of St. Paul the Apostle in New York 1858. The object of the new order was to provide one more in harmony than the older ones with the spirit of American progress and institutions; and nearly all its members are native Americans and converts from Protestantism. He founded also the Catholic Publication Soc., and the *Catholic World*. His most important publications are *Catholicity in the United States* (1879), and *Catholics and Protestants Agreeing on the School Question* (1881).

HECKEWELDER, *hĕk'ĕh-wĕl-dĕr*, John Gottlieb Ernest: 1743, Mar. 12—1823, Jan. 21; b. Bedford, England: missionary. He removed with his parents to America 1754, was a missionary to the Indians in Ohio, Penn., and Mich. 1762–77; was appointed missionary agent for the Moravians 1788, served several times as U. S. peace commissioner to the Indians, became an assoc. judge of the Ohio court of common pleas, published numerous works on Indian archeology, history, languages, and customs, and was a member of the American Philosophical Society.

HECKLE, n. *hĕk'l* [see Hackle: Dan. *hegle*, a heckle—from *hage*, a hook: Sw. *hackla*—from *hake*, a hook]: instrument for preparing flax.—*Heckles*, or *Heckles* (and *Gills*, smaller and finer heckles), are very important parts of various machines for preparation of animal and vegetable fibres for spinning. They consist of a series of long metallic teeth, through which the material is drawn, so that the fibres

may be combed out straight, and so fitted for the subsequent operations. The manufacture of these machines, involves great care and nicety, as any imperfection may cause serious loss, by damaging the fibre which passes through them. For flax, hemp, jute, and similar large and coarse fibres, the teeth of the heckles are large, about eight inches long, of steel wire one-fourth of an inch in diameter. This is gradually reduced from the base upward until it ends in a fine point: the whole is beautifully polished, to prevent injurious friction. They are fixed in a wooden or metallic base, in several rows, alternating with each other at short distances apart, in heckles; but in gills the teeth are much finer, resembling needles, and fewer in number, usually in two rows, constitute a part of the spinning-machinery. The manufacturers of these articles are called Heck-makers. HACKLE, v. in *Scot.*, to ask searching and troublesome questions, as at a candidate for municipal or parliamentary honors. HECKLING, n. *hĕk'lĭng*, act or process of preparing flax; in *Scot.*, a rough off-handed way of questioning a candidate for a seat in parliament as to his views and political principles; in *OE.*, busy interference. HECKLED, pp. *hĕk'ld*.

HECLA, or HEKLA, *hĕk'la:* isolated volcanic mountain in Iceland, of conical shape, about 20 m. from the s.w. coast. Its snow-clad summit is 5,110 ft. high. The principal crater, when visited by Sir George Mackenzie, was about 100 ft. deep, and contained much snow in the bottom. There are many small secondary craters near the summit. The sides of the mountain are broken by numerous deep ravines, forming channels for mountain torrents produced by the melting of the snow. The principal rocks are lava and basalt, covered with the loose stones, scoriæ, and ashes ejected from the volcano. The view from the summit is very desolate and wild. 'Fantastic groups of hills, craters, and lava, leading the eye to distant snow-covered jokuls; the mist rising from a waterfall; lakes embosomed amid bare bleak mountains; an awful and profound slumber; lowering clouds; marks all around of the furious action of the most destructive of the elements, give to the region a character of desolation scarcely to be paralleled.'

A record of the eruptions has been kept since the 10th c. They are few in number, only 43, but they have been always very violent, and generally continuing for a considerable time. One of the most tremendous occurred 1783, when the immense quantity of lava and ashes ejected laid waste a large extent of country. The internal fire remained quiescent as if exhausted, till 1845, Sep., when with terrific energy it again burst forth, and continued active for more than a year. At this time, it poured out a torrent of lava, which at the distance of two m. from the crater was one m. wide, and 40 to 50 ft. deep. A fine dust from this eruption was scattered over the Orkney Islands, 400 m. from Hecla. It was again in eruption in 1878.

HECTARE, n. *hĕk-târ'* [F.—from Gr. *hĕkătŏn*, a hundred: F. *are*, a superficial unit—from L. *ārĕă*, any void

place]: French measure containing 100 French *ares*, or two and a half Eng. imperial acres nearly: see ARE: METRIC SYSTEM.

HECTIC, a. *hĕk'tĭk* [Gr. *hektĭkŏs*, pertaining to habit of body—from *hexis*, habit of body: F. *hectique*, sick of a continual fever: mid. L. *hectīcus*]: constitutional; habitual; troubled with a flushed face, the result of unnatural heat; affected with fevers called *hectic;* also HEC'TICAL, a. *-tĭ-kăl.* HEC'TICALLY, ad. *-lĭ.* HEC'TIC, or HECTIC FEVER, n. a peculiar remitting fever attended with alternate chill and heat: associated with suppurative diseases, and above all with tuberculosis or consumption It is an expression of blood-poisoning, being caused by the absorption of toxic bacterial products in the blood. Generally speaking, the evening paroxysm is more marked; the patient becomes flushed after eating, or in the excitement of conversation. The patient retires to bed, has tossing and uneasy sleep, and wakens in the middle of the night, or toward early morning, bathed in cold perspiration, and in a state of extreme languor. Treatment is that of the causative disease. Much comfort may be obtained by sponging with cool alcohol and water at night.

HECTOCOTYLUS, n. *hĕk'tō-kŏt'ĭ-lŭs* [Gr. *hekătŏn*, a hundred; *kotŭlos*, a cup]: the metamorphosed reproductive arm of certain of the male cuttle-fishes.

HECTOGRAM, or HECTOGRAMME, n. *hĕk'tō-grăm* [Gr. *hekătŏn*, a hundred; *gramma*, a letter, an account]: French weight containing 100 French grammes, being 3½ oz. avoirdupois. See GRAM: METRIC SYSTEM.

HECTOLITRE, n. *hĕk'tō-lē'tr* [Gr. *hekătŏn*, a hundred; *litra*, a pound]: French measure of 100 French litres, about 22 gallons. See LITRE; METRIC SYSTEM.

HECTOMETRE, n. *hĕk-tō-mā'tr*, or HECTOMETER, *hĕk'-tŏm'ĕ-tĕr* [Gr. *hekătŏn*, a hundred; *metron*, a measure]: French measure of 100 French metres, about 328 ft. See METRE; METRIC SYSTEM.

HECTOR, n. *hĕk'ter* [from *Hector*, the famous Trojan warrior]: a bully; a blustering fellow: V. to threaten; to play the bully. HEC'TORING, imp.: ADJ. blustering; insolent. HEC'TORED, pp. *-tĕrd.*

HECTOR, *hĕk'tor:* in legend, bravest hero in the Trojan army: son of King Priam and Hecuba; and married to Andromache, daughter of Eëtion, King of Thebes, in Cilicia, by whom he became the father of Astyanax or Scamandrius, and, as some say, likewise of Laodamas. His exploits as the Trojan Champion are sung by Homer in the *Iliad*. Hector having slain Patroclus, friend of Achilles, the latter, forgetting his quarrel with Agamemnon, took up arms to avenge his beloved companion, and Hector fell by his hand. His body was dragged in triumph by the conqueror round the tomb of Patroclus, but was afterward ransomed by Priam, who caused it to be buried with great pomp. In Ilium, Hector was honored as a hero, and sacri-

fices were offered to him. In compliance with an oracle, his bones are said to have been subsequently conveyed to Thebes, in Bœotia Hector is incontestably the greatest hero in the *Iliad*. Yielding in valor to none, he is defeated by Achilles, not because the latter surpasses him in courage, but because, already wounded and exhausted with prolonged conflicts, he undertakes a single combat, trusting to the aid of Deiphobus. Minerva assumes the form of the latter, and Hector is deceived and forsaken. In humanity, he is superior to all. One of the most beautiful episodes in the *Iliad* is that in which Hector takes leave of his wife Andromache, and expresses his feelings as husband, father, and prince.

HECTOR, *hĕk'tor*, ANNIE (*pseud.* Mrs. ALEXANDER): novelist: b. Dublin, Ireland, 1825; d. London, England, 1902, July 10. Her published works include *The Heritage of Langdale* (1877); *Maid, Wife, or Widow* (1879); *Freres* (1882); *The Admiral's Ward* (1883); *Her Dearest Foe* (1883); *The Executor* (1883); *Look Before You Leap*; *Ralph Wilton's Weird; Valerie's Fate* (1884); *Which Shall it Be?; The Wooing o't: A Second Wife: Beaton's Bargain; By Woman's Wit; Forging the Fetters; Mona's Choice; A Life Interest.* In 1889 she wrote a series of articles to the New York *Herald;* one, *How I Write My Novels*, gave a charming view of her literary methods. Several of her works have been very popular.

HECUBA, *hĕk'ū-ba* (Gr. *Hekăbe*): second wife of Priam, King of Troy. During the Trojan war, she witnessed the destruction of all her sons, except Helenus, and at last saw her husband murdered by the savage Pyrrhus. After the destruction of Troy, she fell into the hands of the Greeks as a slave, and, according to one form of the legend, threw herself in despair into the sea. Euripides (in his tragedy of *Hecabe*) and other ancient tragedians describe her as a tender mother, a noble princess, and a virtuous wife, exposed by fate to the most cruel sufferings. In Sculpture, she is represented as a matron, whose face, furrowed by grief, betrays a character naturally ardent and passionate.

HEDDING, *hĕd'ĭng*, ELIJAH, D.D.: 1780, June 7—1852, Apr. 9; b. Pine Plains, N. Y.: bishop of the Meth. Episc. Church. He entered the Methodist ministry 1800, became presiding elder of the N. H. district 1807, Boston 1811, and Portland, Me., 1817; was elected and ordained bp. 1824, May; and retired from active labor 1848. He was an able theologian, an earnest, practical man, and did much to establish American Methodism on its present substantial basis.

HEDDLE, n. *hĕd'l:* in *weaving*, the meshes by which the *warp* is alternately raised and depressed for the passage of the *weft*. See HEALDS.

HEDENBERGITE, n. *hē'dn-bĕr'jīt:* an important variety of lime-iron augite, of a black or blackish green color, named after *Hedenberg*, the Swedish chemist.

HEDEO'MA. See PENNYROYAL.

HEDERACEOUS, a. *hĕd'ĕr-ā'shŭs* [L. *hĕdĕrā*, the plant ivy]: of or belonging to ivy. HED'ERAL, a. *-ăl*, composed of or pertaining to ivy.

HEDGE, n. *hĕj* [AS. *hegge;* Ger. *hag*, a bush, a shrub: Icel. *heggr*, a kind of bush for hedges—from *hagi*, a hedge: Dut. *hegghe*, a thorn-bush]: a fence of thorn bushes or small trees: V. to guard or protect; to obstruct; to skulk; to hide the head; to inclose as with a hedge; to surround for defense; to guard against loss, or much loss, by betting on both sides; to guard against loss or miscarriage in one kind of venture by undertaking another of a different kind to a modified extent. HEDG'ING, imp. guarding or protecting; among *sporting men*, maneuvering with a bet. HEDGED, pp. *hĕjd*. HEDG'ER, n. *-ĕr*, one who repairs or makes hedges. HEDGE'LESS, a. *-lĕs*, without a hedge. HEDGE-BORN, lowly; obscure. HEDGE-BOTE, in *English law*, right of a tenant to cut wood on the land to repair the hedges or fences. HEDGING-BILL, a pruning-hook. HEDGEPIG: see HEDGEHOG. HEDGE-ROW, n. *-rō*, a thick-set line or row of small trees or bushes forming a fence. HEDGE-SCHOOL, in *Ireland*, an open-air school beside a hedge; a common country school. TO HEDGE A BET, among *betting men*, to bet on both sides in order to guard against great loss.

HEDGE: line of shrubs or trees standing near each other; grown for fences (see FENCE) and for ornamental purposes; extensively used in England; also on the prairies of our western states and in less numbers in other parts of the country. For hedges around door yards and ornamental grounds the arbor-vitæ is largely used at the north and the Cherokee rose at the south. For fencing fields the osage orange and the honey locust are the leading plants, but the former is not entirely hardy at the extreme north, The willow is largely used, especially in moist soils, and the buckthorn, barberry, cedar, hemlock, and several other shrubs or trees, are grown to some extent. In sparsely timbered regions which were also destitute of stones, the hedge was formerly used almost exclusively for fences, but is now largely superseded by barb wire.

The principal objections to hedges for fences are that much work and expense are requisite to start them, while from three to eight years must elapse before they become efficient. In order to keep them within bounds prunning is needed from one to three times each year. They take large quantities of moisture and plant food from the soil, and injure the crops growing by their sides. Some of the shrubs used for hedges also fill the soil with strong roots, which interfere with cultivation in their vicinity, and throw up numerous sprouts, when they are cut or broken. The fact that the hedge cannot be moved to another location is also a serious objection to its use for any except boundary fences.

Before setting a hedge a strip of land at least eight ft. wide should be deeply plowed, and harrowed until the surface soil is very fine. If the land is wet it should be slightly ridged, but if dry a level surface is preferable.

A trench should be opened and the plants or cuttings carefully set in a straight line. During the first season the plants need frequent and careful cultivation Weeds are almost as injurious in a young hedge as they are in a grain field. Vacancies should be promptly supplied by new plants or cuttings. For three or four years the ground near the hedge should be kept clean. Weeds appearing among the plants must be promptly removed. Pruning must be commenced early and continued while the hedge remains.

HEDGE, *hĕj*, FREDERICK HENRY, D.D.: educator: b. Cambridge, Mass., 1805, Dec. 12; d. there 1890, Aug. 21. He studied in Germany 1817–22, graduated at Harvard College 1825 and the Cambridge Divinity School 1828, was ordained a Unit. minister 1829, held pastorates in W. Cambridge, Bangor, Providence, and Brookline till 1872; was prof. of ecclesiastical history in the Cambridge Divinity School 1857–77, and prof. of German in Harvard College 1872–81. He was for several years pres. of the American Unit. Assoc., and editor of *The Christian Examiner*. His writings show rich thought and an attractive style. Beside numerous essays and magazine articles he published: *Prose Writers of Germany* (1848, 3d. ed. 71), *Christian Liturgy for the Use of the Church* (1853); *Reason in Religion* (1865, 2d. ed. 75); *The Primeval World of Hebrew Tradition* (1870); *The Ways of the Spirit, and Other Essays* (1877); *Atheism in Philosophy, and Other Essays* (1884); etc.

HEDGE'HOG, (*Erinaceus*): genus of insectivorous quadrupeds, type of the family *Erinaceidæ*. The muzzle is rather elongated, the neck short, the limbs short, the feet five-toed, the claws strong, the tail short, the body covered on the upper parts with sharp spines, and with hair below, and capable of being rolled up into a ball by means of a powerful muscle extended under the skin. The teeth are 36 in number, 20 in the upper jaw, and sixteen in the lower, but considerable difference of opinion has existed among naturalists as to the character of some of them. The middle incisors are very long, and stand forward; those of the upper jaw are widely separated; the lateral ones small. Like many other *Insectivora*, hedgehogs are not limited to insect food, but prey also on larger animals, as reptiles, small quadrupeds, and birds; they are fond of eggs and of milk, and in confinement will readily eat soaked bread, cooked vegetables, or porridge. Their power of rolling themselves into a ball, from which the spines project on every side, is their means of almost entire protection from enemies. The spines are curiously bent near the root, and so set, that on the contraction of the muscle by which the animal rolls itself up, they are held firmly in their position, their points toward the adversary. They are very strong and sharp; their elasticity is also so very great, that the animal can sustain falls from great heights without apparent injury.

The Common Hedgehog (*E. Europæus*) is a native of most parts of Europe. Its short ears are one of its distinctive specified characters. It is seldom above 9½ inches in length. Its spines are about an inch long. It readily kills snakes, and even vipers, which it eats, beginning always at the tail. It is said to be capable of resisting in an extraordinary degree not only the venom of the serpents, but other kinds of poison, however administered. It brings forth from two to four young at birth, and provides for the occasion a curiously constructed nest of dry leaves, of which the roof is capable of throwing off the rain. The young are blind at first; their ears also are closed—as unusual as the former is common among animals—their bodies are covered with soft incipient spines. In winter, the hedgehog becomes torpid, retiring to some hole or nest at the base of a tree, beneath roots, or in some such situation. It provides no winter store, and scarcely any other European animals hibernate so completely. The hedgehog is easily tamed, becomes very familiar, and is very useful in houses where *black beetles* are troublesome. Night is its period of activity. Other species of hedgehogs are found in Asia and Africa.

HEDGE'HOG PLANT: name given to those species of medick (*Medicago*) which have the pods spirally twisted and rolled into a ball, beset with spines. The peculiar appearance of the pods makes them objects of interest, on which account they sometimes find a place in flower-borders; and like the other medicks (q.v.), they are useful in the countries in which they abound, as affording excellent food for sheep and cattle. They are particularly plentiful on sandy ground near the sea in parts of S. America, and their pods are too plentiful in the S. American wool exported to Europe and America.

HEDGE-MUS'TARD (*Sisymbrium*): genus of plants of nat. ord. *Cruciferæ*, mostly annual or perennial herbaceous plants with very various foliage, small yellow or white flowers, and a long, roundish or 6-angled pod (silique). The Common Hedge-Mustard (*S. officinale*), was formerly employed in medicine for catarrhs and other ailments. It is said to be diaphoretic and expectorant. It has a mild pungency, and is sometimes cultivated as a pot-herb. It is an annual, plentiful in waste places and by waysides, sometimes two ft. high, branched, with runcinate or deeply lobed leaves, stem and leaves hairy, flowers very small and yellow. The pods are erect, and closely pressed to the stalk.—Broadleaved Hedge-mustard, or London Rocket (*S. irio*), is said to have sprung up in great abundance on the ground desolated by the fire of London 1666.—Fine-Leaved Hedge-Mustard, or Flix-weed (*S. Sophia*), about 2 ft. high, growing in waste places, having leaves doubly or trebly pinnatifid, was formerly administered in dysentery and hysteria, and the seeds as a vermifuge.

HEDGE-SPAR'ROW, or Hedge-War'bler, or Hedge-Accen'tor, or Dun'nock (*Accentor modularis*): little bird

of the family *Sylviadæ*, a common native of most parts of Europe. It is not quite so large as the house-sparrow which it somewhat resembles in dull brownish plumage, but in little else; its slenderness of bill, and its whole form, showing it at once, notwithstanding its name, to be of a different family. The position of the genus is doubtful, but it is, with probability, referred to the thrushes and warblers. It feeds principally on insects. It is one of the earliest spring songsters, having a sweet plaintive song; and the nest is one of the first that is seen in spring. The nest, of green moss, roots, and wool, lined with hair, is usually placed rather low in a bush or hedge. The eggs are four or five in number, of a delicate and spotless bluish green. The cuckoo very often lays its egg in the hedge-sparrow's nest. The hedge-sparrow is found in summer chiefly in northern temperate Europe, migrating southward in winter; but in Britain it remains all the year. Another species of the same genus, the Alpine Warbler, or Alpine Accentor (*A. Alpinus*), a larger bird, lighter and more varied in color, has in a few instances been found in Britain; it is common in the Alps, and other mountains of France, Germany, and Italy. Other species of accentor are found in the old and new world. They all are of dull plumage. In this genus the bill is more conical than in the other *Sylviadæ*.

HEDIN, Sven Anders, *svĭn ân′dĕrz hĭ-dēn′*. Swedish geographer and explorer: b. Stockholm, 1865, Feb. 19. was educated at Stockholm, Upsala, Berlin, and Halle, at the latter university receiving the degree of doctor of philosophy. In 1885 he began his first journey of exploration through Persia and Mesopotamia. In 1890 he went to Persia as a member of King Oscar's embassy to the Shah, and the next year journeyed through Khorassan and Turkestan. In 1893 he set out on a remarkable journey from the Russian frontier to Pekin, through Tibet and the Lob-nor region. He arrived at his destination in 1897, having experienced four years of exciting and harrowing adventures. His second expedition to Central Asia began in 1899. In 1901, writing from Narkhlik, Dr. Hedin tells of finding the ruins of a beautiful Buddhist temple, some rare specimens of wood carving and 12 complete letters written in Chinese on paper and marvellously well preserved. Dr. Hedin has written several books, four in English: *A Journey Through Persia and Mesopotamia* (1887); *King Oscar's Embassy to the Shah of Persia* (1891); *A Journey Through Khorassan and Turkestan* (1892); *Through Asia* (1898). He wrote also a scientific treatise in German, *The Results to Geographic Science of My Travels in Central Asia*.

HEDJAZ, *hĕj-âz′* (the land of pilgrimage): maritime province of Arabia, extending along the e. shore of the Red Sea; bounded n. by the Syrian desert and the Gulf of Akaba, e. by the province of Nedjed, and s. by that of Yemen. It is almost entirely unproductive, being chiefly andy or stony. Containing the two sacred cities, Mecca

and Medina—the former the birthplace of Mohammed, the latter the place in which he is interred—Hedjaz is the 'Holy Land' of Arabia. It is traversed annually by vast numbers of pilgrims.

HEDJ'RAH. See HEGIRA.

HEDONIC: having to do with pleasure, as hedonism, the ethical point of view which finds the ultimate good connected with pleasure. Used also to indicate the *tone* of sensations and ideas which are agreeable.

HEDONISM, n. *hē'don-ĭzm* [Gr. *hēdonē*, pleasure enjoyment]: tenets of the Cyrenaic school of philosophy, founded by Aristippus, a disciple of Socrates, who taught that pleasure was the end of life, and that it was the duty of a wise man to enjoy it without being controlled by it: see ARISTIPPUS. One of the most eminent of this school was Euhemerus: see EUHEMERISM. Hedonism, or the Cyrenaic doctrine, finally gave way to Epicureanism. Modern Hedonism is represented by Utilitarianism (q.v.). See ETHICS.

HEED, n. *hēd* [AS. *hedan;* Dut. *hoeden;* Ger. *hüten*, to keep guard, to observe: comp. Gael. *uidh*, care, attention]: care; attention; regard: V. to regard with care; to mind; to observe; to attend to. HEED'ING, imp. HEED'ED, pp. HEED'LESS, a. careless; inattentive. HEED'LESSLY, ad. *-lĭ*. HEED'LESSNESS, n. inattention; carelessness. HEED'FUL, a. *-fûl*, attentive; watchful; observing. HEED'FULLY, ad. *-lĭ*. HEED'FULNESS, n. vigilance.

HEEL, n. *hēl* [AS. *hel;* Icel. *hæll;* Dan. *hael;* Dut. *hiel*, the heel]: the hind part of the foot; hind part of a shoe or stocking; the latter or remaining part of a thing; among seamen, the lower end of anything, as of a mast: V. to add a heel to; in *OE.*, to dance. HEEL'ING, imp. HEELED, pp. *hēld*. HEEL-PIECE, a piece fixed on the heel of a shoe. HEEL-TAP, n. in *toasting*, the liquor left undrunk in a glass. NECK AND HEELS, the whole length of the body. TO BE AT THE HEELS, to pursue closely; to follow hard. TO GO HEELS OVER HEAD, to go over so as to bring the heels uppermost; to move in a hasty, precipitate manner. TO HAVE THE HEELS OF, to outrun. TO LAY BY THE HEELS, to fetter; to confine. TO SHOW THE HEELS, to flee; to run from. TO TAKE TO THE HEELS, to take to flight. OUT AT HEELS, worn out; in very poor or decayed circumstances, as stockings worn out at heels. HEELER, in *politics*, one who has direct control and management of a few votes in a given district.

HEEL, v. *hēl* [AS. *hyldan*, to incline: Icel. *halla*, to lean toward: Dan. *helde*, to slope]: to lean on one side, as a ship. HEEL'ING, imp.: N. the leaning over to one side of a vessel. HEELED, pp. *hēld*.

HEEM, *hām*, JAN DAVIDSZ VAN, or JOHANNES DE: the most celebrated painter of what is called 'still-life' that the Dutch school has produced: born at Utrecht 1600 or 1604; d. 1683 or 4. He studied under his father, and soon

obtained immense sums for his pictures. Toward the close of his life, he removed to Antwerp, where he died.

Heem's pictures represent, for the most part, splendid vases of fruits and flowers, musical instruments, and ornaments of various kinds. He painted a garland of flowers for a certain Jan Vander Meer; who refused 2,000 guilders for it, but afterward gave it to the Prince of Orange, who took it with him to England. Heem's coloring is exquisite, and his use of *chiaroscuro* unsurpassable.

HEEN, *hēn*—CHOW, *chow*—TING, *tĭng*—FOO, *fô:* Chinese geographical terms, designating the relative rank of cities and districts. *Heen* indicates the smallest division, though its city may be an important one; thus, Shanghai-heen is a large city and district, while the dept. in which it is situated, Sungkiang-*foo*, to which it is subordinate, is a smaller place. Generally speaking, however, the terms designate the rank of cities, from *foo*, the chief, to *heen*, the least in size.

HEER, or HIER, n. *hēr* [*Scot.*]: the sixth part of a hasp or hank of yarn; two cuts.

HEEREN, *hā′rĕn*, ARNOLD HERMANN LUDWIG: German historical scholar: 1760, Oct. 25—1842 Mar. 7; b. Arbergen, near Bremen, where his father was at that time pastor. He received his education at the cathedral school of Bremen, and the Univ. of Gottingen. He made himself known to the literary world by two philological works—an edition of Menander's *De Encomiis* (Göttingen 1785), and *Eclogæ Physicæ et Ethicæ* of Stobaeus (4 vols. Göttingen 1792–1801). In 1794, he was appointed prof. of philosophy, and 1801, prof. of history at Göttingen. He married 1797 a daughter of Heyne. His lectures in the university referred, from the very first, more to Greek and Roman antiquities, and to the history of the fine arts, than to philology, strictly so-called: the latter, indeed, was finally quite thrown in the background. In 1793–96, appeared at Göttingen his *Ideen über Politik, den Verkehr und den Handel der vornehmsten Völker der alten Welt* (4th edit. 5 vols. 1824–26), which has secured him a place among the most eminent modern historians. Less satisfactory to scholars was *Geschichte des Studiums der classichen Literatur seit dem Wiederaufleben der Wissenschaften* (2 vols. Gött. 1797–1802); but *Geschichte der Staaten des Alterthums* (Gött. 1799; 5th ed. 1826), and his *Geschichte des Europ. Staatensystems und seiner Colonien* (Gött. 1809; 4th ed. 1822) abounded in new views and acute expositions. For *Untersuchungen über die Kreuzzüge*, he received the prize from the National Institute of France. His *Kleine historische Schriften* (3 vols. Gött. 1803–08) contain interesting treatises. In 1821–26, he published an edition of all his historical works (*Historischen Werke*), 15 vols. His works are characterized by calmness, impartiality, and insight.

HEFT, n. *hĕft* [from *heaved*]: in *OE.*, a heaving or retching; an effort

HEFT, n. *hĕft*. See Haft.

HEGEL, *hā'gĕl*, Georg Wilhelm Friedrich: one of the greatest German philosophers: 1770, Aug. 27—1831, Nov. 14; b. Stuttgart. His father was an official in the fiscal service at Würtemburg. Hegel became, 1788, a student in the Tübingen Theological Institute, where his speculative abilities, however, were outshone by his younger companion Schelling. After leaving the university 1793, he was a family tutor at Bern and Frankfurt-on-the-Maine for six years, while he applied himself chiefly to the study of the life of Jesus, considered as simply the son of Joseph and Mary, and of the philosophy of religion. In the beginning of 1801, he left Frankfurt for Jena, where he published his first work, *Ueber d. Differenz d. Fichte'schen u. Schelling'schen Systems* (1801), and entered the univ. as *Privat-docent*. Next year, he joined Schelling, to whose philosophy he seems at this time to have adhered, in the editorship of *Das Kritische Journal für Philosophie*. His lectures in Jena did not attract much notice, but it was at this place, while the din of the battle in 1806 was sounding through the town, that he completed his first important work, *Die Phänomenologie d. Geistes* (1807), which he used afterward to call his voyage of discovery. Shortly before the battle, he had been made extraordinary prof. of philosophy; but the disaster which that conflict brought upon Jena compelled him to seek subsistence elsewhere, and he went, accordingly, at Niethammer's request, to Bamberg, where he edited a political paper for two years. In 1808, he was appointed rector of the gymnasium at Nuremberg, and there he had just completed his *Wissenschaft d. Logik* (3 Bde. 1812–16), when he was called, 1816, to a professorship of philosophy in Heidelberg, where he published *Encyklopädie d. philosophischen Wissenschaften* (1817; 3te Aufl. 1830), in which first he developed his complete system. In 1818, he was called to Fichte's place in Berlin, and there he began to gather around him a new philosophical school. His lectures, delivered in a stammering voice, and without rhetorical ornament, yet with the impressiveness of being the expression of laborious thought, attracted hearers from all ranks and professions. He rose to considerable political influence through his official connection with the Prussian government, and his philosophy in some respects lost credit from the general conservative tendencies of his administration. Still, in his *Rechts philosophie* (1821), he demands representation of the people, freedom of the press, publicity of judicial proceedings, trial by jury, and the administrative independence of corporations. In the midst of an active life, he was suddenly cut off by cholera, and was buried beside Fichte. A complete collection of his works was published, 18 vols. (Berlin 1832–41), and his life written by Rosenkranz (1844).

At first, as has been intimated Hegel's philosophy started from the same position as Schelling's—the principle of the identity of knowing and being; but he soon departed from

Schelling's theory, that this identity can be apprehended only through an intellectual intuition, of which the understanding can render no account. Carrying out rigorously the principle from which both started, as embodied in the proposition of Spinoza, that the order and connection of thoughts are the same as the order and connection of things, Hegel sought to find the universal form which characterizes the process both of existence and thought. This universal form he recognized as the process of becoming (*Werden*). But the process of becoming is only the union of position and negation; for all that becomes at once posits and, by passing into something else, removes itself Identical with this process is the process of thought; for every thought involves its contradictory. But the contradictory is not a mere negation; it is in itself positive; the conception of unity, e.g., is not more positive than its contradictory, the conception of plurality. Every thought, therefore, as it involves its contradictory, adds to its own contents, and by the combination of the two contradictories, we rise to absolute knowledge. This process, involving in it the three stages of position, negation, and the union of both, determines the method of Hegel; for according to this method, his entire system is organically necessitated in all its parts to a threefold division corresponding to the three stages in the process of thought and existence. The point from which all knowledge must start is thought simply and in itself, the science of which, logic, forms, therefore, the first part of this system. But thought passes into something other than itself, exists out of itself in nature, and the philosophy of nature accordingly ranks as the second part. Returning again from its estrangement in nature, thought becomes conscious of itself in mind, and consequently the philosophy of mind forms the third part. It would be profitless to give a mere enumeration—and nothing more could be attempted here —of the various subdivisions, in their degrees of subordination, into which these three grand divisions are separated. For an account of the system, consult, besides the ordinary histories of philosophy, Vera's *Introduction à la Philosophie de Hegel* (Paris 1855), and Haym's *Hegel u. seine Zeit* (Berlin 1858). For the English student of Hegel, Dr. Hutchison Stirling's *Secret of Hegel*, and McTaggart's *Studies in the Hegelian Dialectic* are invaluable.

Hegelianism is commonly employed to denote the direction of philosophical speculation in the large school which arose under the influence of Hegel. During Hegel's life and on till 1841, when Schelling came to Berlin, Hegelianism found a very efficient organ in the *Jahrbücher für wissenschaftliche Kritik* (1827–47, ed. by Henning); and through the influence of the Prussian minister, Von Altenstein, a large number of the philosophical chairs in the Prussian universities were secured for Hegelian professors. In the second grand department into which Hegel had divided his system, the philosophy of nature, his speculations did not give the same impetus to inquiry as those of

Schelling had given: but this may be accounted for from the consideration that the enthusiasm for physical investigations, which was rising when Schelling's early speculations appeared, had reached its culmination before Hegel began to attract notice. In logic, also, owing to Hegel's own exhaustive treatment, little has been done by his disciples, except in the way of explication and apology, of which Schaller's, Erdmann's, and Hinrichs's works on the science are specimens. But in psychology we find developments of the Hegelian principles by Rosenkranz, Michelet, and Erdmann: in jurisprudence, by Gans; in ethics, by Michelet; in æsthetics, by Vischer, Hinrichs, Hotho, Rosenkranz, Ruge, and Schnaase; in the history of philosophy, notwithstanding Hegel's own work, by Erdmann, Michelet, Rosenkranz, Schwegler, Zeller, etc. In the philosophy of religion, however, Hegelian speculation has been more widely and powerfully influential than in any other department—Daub, Marheineke, Rosenkranz, Conradi, Göschel, Vatke, and a host of other more or less known writers, joining with Hegel in seeking to elicit the eternal meaning embodied in the historical and symbolical forms of Christianity. But as soon as Hegelianism reached this sphere of speculation, it began to develop antagonistic tendencies. These became especially apparent four years after Hegel's death, in the controversy raised by Strauss's *Leben Jesu* (1835), and continued by his *Christliche Glaubenslehre* (1840). The Hegelians then split into three sections, called severally the right, left, and centre, according as they represent supernaturalism, rationalism, or a mediating mysticism. Among those of the extreme left, known also as the *Young Hegelians*, and dubbed by Leo with the felicitous but untranslatable diminutive *Hegelingen*, the Hegelian philosophy, which had before been ecclesiastically and politically conservative, became thoroughly radical. In 1838, Ruge began to edit for them a special organ, *Die Halleschen Jahrbücher*, which had great influence among the youth of Germany, but was prohibited, 1847, after having been transferred to Leipsic under the title *Die Deutschen Jahrbücher*. Weisse, Fichte (the younger), Ulrici, Fischer, and Carriere, were named pseudo-Hegelians, because, though retaining a large element of Hegelianism, they introduced at times an extraneous method and divergent results. As an independent system, Hegelianism, is not now recognizable in Germany, though its general leavening influence may be traced through many ramifications in various systems of philosophy. Beyond Germany, Hegelianism in some of its forms is represented in France, in Italy, in Denmark, and in Sweden by numerous philosophers of note; and in somewhat modified form as Neo-Hegelianism, has also in recent years exerted an important influence on British and American thought, especially in the regions of logic and psychology.

HEGEMONIC, a. *hē′jĕ-mŏn′ĭk* [Gr. *hegĕmŏnĭkos*, fitted for a command, chief]: ruling; predominant; also HEGEMON′ICAL, a. *-ĭ-kăl*. HE′GEMONY, n. *-mŏn-ĭ* [Gr. *hēgĕ*

mŏnĭă, leadership]: leadership of one state over another; preponderant influence or authority.

HEGESIPPUS, *hĕj-e-sĭp′pŭs:* earliest of the Christian Church historians. He was born of a Jewish family in Palestine about the beginning of the 2d c., but became a Christian at an early age, and was a member of the Church in Jerusalem. He is supposed to have died 180. He went to Rome in the pontificate of Anicetus, visiting on his journey many churches, and especially that of Corinth, where Primus was bishop. He remained in Rome till the death of Soter (176). It was during his sojourn in Rome that he composed his history, in five books, *Memorials of Ecclesiastical Affairs*, which, however, appear not to have formed a complete and continuous history, though they extend from the death of Christ down to the writer's own age. Unhappily, the work, as a whole, has perished, and we know it only from some fragments which Eusebius has embodied in his own history, and the most important of which are his account of the martyrdom of St. James and of St. Simeon of Jerusalem. Eusebius speaks highly of the doctrinal fidelity of Hegesippus, and St. Jerome of the simplicity and purity of his style. Another work on the Wars of the Jews (also in five books), ascribed to Hegesippus, is confessedly spurious. The most complete collection of the fragments of his writings is that of Gallandus, in vol. II. of his great collection. See also Grabe, *Spicilegium*, II.; and Fabricius, *Bibl. Græca*, VII. 156.

HEGIRA, or Hedjrah, n. *hē-jī′ră* or *hĕj′ră*, more fully Hedjrat Al-Nabi [Ar. *hadjara*, to remove or desert; *hijrah*, separation, emigration]: Emigration of Mohammed (q.v.); the Mohammedan era, dating from 622, July 15 or 16—assumed as the date of Mohammed's leaving Mecca; thence, any exodus or departure. The tribe of the Koreish having resolved to slay the new prophet, their kinsman, he secretly left Mecca, 622, Sep. 22, and went to Medina, where, partly from a feeling of jealousy toward Mecca, partly because his new doctrine had already found here many adherents, he was so well received and so vigorously supported in the wars which he then began to wage against his adversaries, that the rise and progress of Mohammedanism was said to date in reality from the time of Mohammed's leaving Mecca. The Hegira, therefore, was made the starting-point of a new era—the Mohammedan (Tarikh Alhijrah)—by Caliph Omar, who, 639 or 640, with the aid of a Persian, Harmozan, instituted the new Moslem calendar. It does not, however, as is generally supposed, begin from the day of the departure itself, but from the first of the Moharram (the first month of the year) preceding it—i.e., 68 days earlier.

The Mohammedan year, as a lunar year, is shorter than ours by 10 days, 21 hours, and $14\frac{2}{5}$ seconds; and this renders the exact transfer of Mohammedan dates into dates of the Christian calendar a very difficult task. An elaborate method has been invented for that purpose by Ideler;

an easy though not minutely accurate way of finding the year, but not the month and the day, is by the deduction of 3 per cent. from the given Mohammedan year, and the addition of 622 to the sum so obtained; e.g., the year of the Hegira corresponding to A.D. 1862 being 1279, deduct 3 per cent., or about 39, = 1240, add 622 = 1862.

HEIDELBERG, *hī'dĕl-bĕrĉh,* or *-bĕrg:* ancient city of Germany, in the grand duchy of Baden, on the left bank of the river Neckar, in one of the most beautiful districts in the country, on a narrow strip of ground between the river on the n., and the n. extremity of the Geisberg Mountains on the south. It is 13 m. s.e. of Manheim, and about 54 m. s. of Frankfurt-on-the-Maine. The town consists mainly of one street about three m. in length. Among its most important buildings are the Church of the Holy Ghost, through which a partition-wall has been run, and in which service according to the Rom. Cath. and Prot. rituals is simultaneously carried on; the Church of St. Peter's on the door of which Jerome of Prague, companion of Huss, nailed his celebrated *theses,* at the same time publicly expounding his doctrines before a multitude assembled in the churchyard; and the ruins of the castle which was formerly the residence of the Electors Palatine, and which, 1764, was set on fire by lightning, and consumed. In the cellar under the castle is the famous Heidelberg Tun, 36 ft. long and 24 ft. high, and capable of containing 800 hhds. Other buildings are, the town-house, the post-office, gymnasium, real-schule, and other schools. The manufactures, comparatively unimportant, include cement, tobacco, cigars, fire-extinguishing apparatus, shoddy, mathematical and surgical instruments, leather, etc., and there are also several breweries. Heidelberg has fine public walks, and an electric street railway system. The gardens around the castle are well laid out, and at every turn present the finest views of the Neckar, and the fertile and richly wooded valley through which it winds to join the Rhine. Behind the town and castle, a carriage-road leads by easy ascent to the top of the Königstuhl, the loftiest hill of the district, from which an extensive view is obtained of surpassing beauty.

Heidelberg is celebrated for its university, which, after those of Prague and Vienna, is the oldest in Germany. It was founded by the Elector Ruprecht I., 1356; and after receiving papal sanction, 1386, flourished until the thirty years' war, when it began to decline. In 1802, however, when the town, with the surrounding territory, was assigned to the Grand Duke of Baden, and in 1803, when the Elector Charles Frederick raised the university to a new life, its new era began, and it rapidly became famous. It comprises faculties of theology, law, medicine, and philosophy, has about 150 professors and lecturers, and is attended by about 1,500 students, including 800 to 900 in summer: of these a great proportion are English and Americans. Its library consists of about 500,000 vols., and many valuable MSS. The quincentenary of the university was celebrated with elaborate ceremonials, 1886.

PANORAMA OF HEIDELBERG.

Heidelberg, originally an appanage of the bishopric of Worms, became, 1155, the seat of the Counts Palatine, and continued to be so for near six centuries, undergoing all the vicissitudes of that much-suffering electorate: see PALATINATE. After the Reformation Heidelberg was long the headquarters of German Calvinism, and gave its name to a famous Calvinistic catechism. Heidelberg suffered much during the thirty years' war, was savagely treated by the French, 1688, and was almost totally destroyed by them, 1693. Pop. (1900) 40,121.

HEIDELBERG CATECHISM, *hī'dĕl-bĕrg:* a catechism published first at Heidelberg, 1563, drawn up by Zechariah Ursinus for the use of the Reformed Church, and published in the Palatinate. It was received beyond this limit, was approved by the Synod of Dort, and was the model on which the Westminster Assembly framed the Shorter Catechism: see HEIDELBERG.

HEIDELBERG UNIVERSITY, Ohio, a coeducational institution at Tiffin, founded in 1850, under the auspices of the Reformed Church in the United States. It has departments of theology, commerce, oratory, art, and music, and preparatory and summer schools. In 1906 it had 27 professors and instructors; 417 students; a library of over 25,000 volumes; the grounds and buildings were valued at $125,000; the productive funds amounted to $275,000, and the income to $20,000.

HEIDENMAUER, *hī'dn-mow-ĕr*: (1) a name given in Germany to the remains of old German and Roman fortresses and ramparts, some of which still exist, especially at Ottilienberg, a hill of the Vosges, in Alsace. (2) The title of a novel by James Fenimore Cooper, who laid the scene of his story in the Vosges during the middle ages.

HEIFER, n. *hĕf'ĕr* [AS. *heafore*—from *heah*, high; *fear*, an ox: prov. Eng. *heckfor*]: *literally*, a full-grown ox or cow; a young cow.

HEIGH-HO, int. *hī'hō:* an exclamation expressing uneasiness or languor.

HEIGHT, or HIGHT, n. *hīt* [from HIGH, which see: Dut. *hoogte*, height—from *hoog*, high]: distance above the ground; elevated ground; a hill; altitude of any thing or person; elevation of rank, excellence, or fame; highest state; crisis. HEIGHTEN, or HIGHTEN, v. *hīt'n*, to raise higher; to increase; to improve; to aggravate. HEIGHTENING, or HIGHTENING, imp. *hīt'nĭng:* N. the making high; exaltation. HEIGHTENED, or HIGHTENED, pp. *hīt'nd.* SYN. of 'height': elevation; altitude; summit; ascent; eminence; pre-eminence; prominence.

HEIGHTS, MEASUREMENT OF: operation performed in any one of four ways: by the aid of trigonometry; by leveling; by ascertaining the atmospheric pressure at the top and bottom of the height by the barometer; or by ascertaining the boiling-point of water at the top and bottom by the thermometer. For the second and third methods (see LEVELLING: BAROMETER): the first and fourth are here

considered. The first method is often more convenient than any of the others, as it does not require the ascent of the height, nor even a near approach to it. There are two cases of the problem:—Case 1 (when there is level ground in front). Let ACD be a height of irregular form, take O and M, two stations on the level ground in front, find the

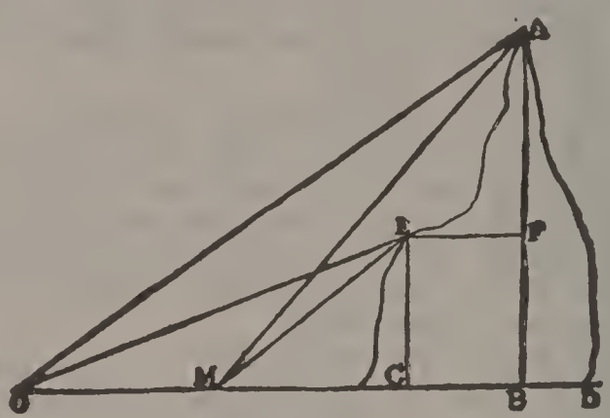

Fig. 1.

angles AOB, AMB, and measure OM; then as AOM, AMO (which is AMB subtracted from 180°), and OM are known, AO can be found; and since now AO and the angle AOM are known, AB can be found. If the height is regular in form, all that is necessary to be done is to measure OC, calculate CB, find AOB; then AB can at once be calculated by the ordinary rules.—Case 2 (when there is no level ground in front). Suppose the height of A. above O (fig 2) is to be found. Take another station M, from which A and O are visible, measure the angles AOM, OMA, and find OM by levelling (q.v.), then OA can be found; at O take the angle AOB (the angular altitude of A), then from OA and AOB, AB can be known. If the height of one point above

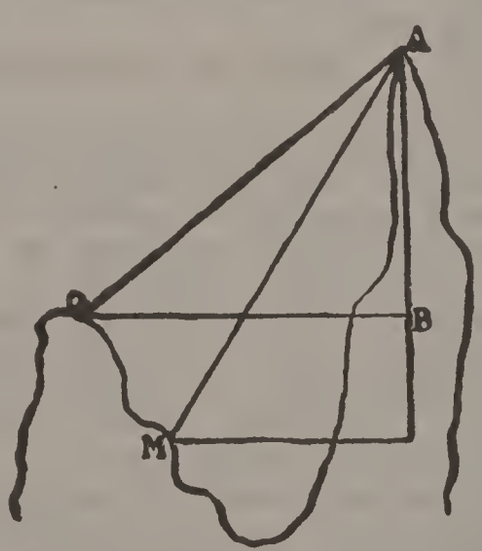

Fig. 2.

another—the latter not being the observer's station—be required, then the height or depression of the first, and the height or depression of the other above or below the observer's station, must be found separately as before, then

the difference (if both are above or both below the observer's level) or sum (if one is below it) of these results gives the number required. For instance (Fig. 1), the height of A or AB is first found, CE or the height of E is next calculated and their difference, AB—CE, or AF, is the height of A above E.

Besides this rigorous trigonometrical method, there are many ways of estimating approximately the height of objects, with little or no calculation. For instance, if the height is perpendicular, and the ground in front on a level with the base, take two pieces of wood, hinged or jointed together at an angle of 45°, or a large pair of compasses opened at that angle; place one leg horizontal and directed to the base of the object, and move the instrument toward it, or from it, until the other leg point to the top; then the distance of the angle from the bottom gives the height.

The fourth method is often used in measuring the height of mountains when great accuracy is not required, or when the apparatus requisite in applying the other methods is not at hand; all the apparatus required in this method being two thermometers, a tin pot to boil the water, and a book of tables. The method depends on the fact, that vapor of water or steam has a certain tension or elastic force according to its temperature, thus: at 32° it can support 0.2 of an inch of mercury; at 80° it can support 1 inch; at 150°, 7.42 inches; at 180°, 15.5 inches; at 212° (the ordinary boiling-point), 30 inches, or the whole pressure of the air. By observing, therefore, the temperature at which water boils, we can find, by means of a table of the elastic force of vapor at different temperatures, the pressure, in inches of mercury, to which it is subject at the time. Now, beginning at the level of the sea, it is found by experiment that a fall of 1° in the boiling-point corresponds to an elevation of 510 ft.; at an elevation of 2,500 ft., the difference for a degree is 520 ft.; at 5,000, it is 530 ft.; at 17,000, it is 590 ft. An approximation for medium elevations may be made by taking 530 ft. on an average for the difference corresponding to 1°, then 530 *multiplied by the number of degrees between the boiling-point and* 212 *will give, approximately, the height.*

HEILBRONN, *hīl-brōn'* (formerly, *Heiligbronn, holy well*): important trading and manufacturing town of the kingdom of Würtemberg, in the circle of Neckar, on the right bank of the river Neckar, in a beautiful and fertile valley, 28 m. n. of Stuttgart. The church of St. Kilian, built 1013—1529, a noble edifice, partly Gothic and partly Renaissance; the old town-hall, *der Diebsthurm*—the Thief's Tower—in which Götz von Berlichingen was confined; and the house of the Teutonic knights, now a barrack, are the chief buildings. Though wine and field and garden produce are still cultivated by many of the inhabitants, trade and manufactures are the chief branches of industry. Paper, chemical products, silk, dye-stuffs, gold, silver, and iron wares, tobacco, vinegar, etc., are manufac-

tured for export. Gypsum and sandstone are quarried in the vicinity. Pop. 37,900.

HEILPRIN, *hīl'prĭn*, ANGELO, American naturalist: b. Satoralja-Ujhely, Hungary, 1853, March 31; d. New York City, 1907, July 17. He was a son of Michael Heilprin (q.v.), and came with his parents to the United States in 1856, but received his education later in Europe, making a special study of natural history. On his return to America, his scientific ability was speedily recognized and he became successively professor of invertebrate palæontology and geology (1880–1900), and executive curator (1883–91) at the Academy of Natural Sciences, Philadelphia. From 1885 to 1890 he was professor of geology at the Wagner Free Institute. He was for five years president of the Geographical Society of Philadelphia, was leader of the Peary Relief Expedition in 1892 and made a journey of research to investigate the cause of the Mont Pelée (q.v.) disaster in 1902. His published works include: *Contributions to the Tertiary Geology and Palæontology of the United States* (1884); *Town Geology*; *The Lesson of the Philadelphia Rocks* (1885); *Geographical and Geological Distribution of Animals* (1887); *Explorations on the West Coast of Florida and in the Okeechobee Wilderness* (1887); *The Geological Evidence of Evolution* (1887); *The Animal Life of our Seashore* (1888); *The Bermuda Islands: a contribution to the Physical History and Zoology of the Somers Archipelago* (1889); *Principles of Geology* (1890); *The Arctic Problem and Narrative of the Peary Relief Expedition* (1893); *The Earth and its Story* (1896); *Alaska and the Klondike* (1899); *Mont Pelée and the Tragedy of Martinique* (1903); *Tower of Pelée* (1905).

HEILPRIN, MICHAEL: 1823–1888, May 10; b. Piotrkow, Poland: scholar. He removed with his parents to Hungary 1842, joined the revolutionary party 1848, was in charge of the literary bureau in the interior dept. of Louis Kossuth's brief govt. 1849, and with his father came to the United States 1856. He contributed to the literary journals and magazines, was one of the chief compilers of *Appleton's American Cyclopædia*, published *The Historical Poetry of the Ancient Hebrews*, 2 vols. (1879–80), and was active in settling a large number of Russian-Jewish refugees on agricultural lands in the United States 1882–3.

HEIMSKRIN'GLA. See SNORRI STURLESSON.

HEINE, *hī'nĕh*, HEINRICH: German poet, journalist, essayist, and wit: 1797, Dec. 13—1856, Feb. 17; b. Düsseldorf, of Jewish parents. In 1819, he proceeded to the Univ. of Bonn for the purpose of studying law; but he applied himself with greater ardor to modern and ancient German literature, under the guidance of his master and friend, August Wilhelm Schlegel. He subsequently studied at Berlin and at Göttingen, at which latter place he took his degree doctor of law 1825. About this time he was baptized in the Lutheran Church of Heiligenstadt. For this so-called 'apostasy' he has received much abuse,

which seems out of place, as he never gave signs of being very much of a Christian, and had been only nominally a Jew. As a change of position for secular reasons, his act is open to criticism on a different line. He was none the less ready to champion the Jew with even greater ardor. A visit to the Hartz and to Italy supplied him with materials for his *Reisebilder* (Pictures of Travel, Hamb. 4 vols. 1826–31). This book obtained, on its first appearance, an extraordinarily brilliant success. 'Young Germany', in particular, became wild with enthusiasm. His *Buch der Lieder* (Book of Songs, Hamb. 1827; 32d edit. 1872)—a portion of which had first appeared as *Youthful Sorrows*, Berlin, 1822—was no less fortunate. Many of these songs are of the most exquisite and ethereal beauty. They are unmatched in German literature, except by the lyrics which Goethe wrote in his youth. The revolution of July threw Heine into a violent fit of democracy, and in 1831 appeared his *Kahldorf über den Adel, in Briefen an den Grafen M von Moltke* (Kahldorf on the Aristocracy, in Letters addressed to Count M. von Moltke). His freedom of opinion and language gave great offense to the government, and he seems to have been in some danger of imprisonment, at any rate, he found it advisable to leave Germany, and 1831, May 1, he went to Paris, where he resided for the rest of his life, cultivating belles-lettres, both with a brilliancy and with a malice hitherto almost unheard of. In 1835, he married a certain 'Mathilde,' who figures much in his writings, and in 1843–4 visited his native country, to see his mother. On his return, he published *Deutschland; ein Wintermärchen* (Germany; a Winter's Tale), in which he recounts imaginary adventures and burlesque episodes, and in which a great number of his countrymen, kings, statesmen, professors, authors, artists, etc., are mercilessly satirized and abused. In 1847, Heine was attacked by disease of the spine, and was almost constantly bedridden. He suffered the most acute pain, together with the loss of eyesight, with remarkable equanimity, till his death, which took place at Paris. His will expressed a desire that no religious ceremonies should be celebrated at his funeral. 'This,' however, he adds, 'is not the weak fancy of a freethinker. For the last four years, I have cast aside all philosophical pride, and have again felt the power of religious truth.' Besides the works already mentioned, Heine wrote *Französische Zustände, Der Salon, Shakspeare's Mädchen, und Frauen, Neue Gedichte, Atta Troll, Romanzero*, etc. A complete edition of his works was published at Philadelphia by John Weik, 1856; another by Hoffmann Campe, Hamburg (1861–63). A French edition of his works (Michel Levy, Paris) was prepared, with his co-operation, by Loewe-Weimars, Gérard de Nerval, and St. Réné-Taillandier. English versions of some of these are Leland's translation of *The Pictures of Travel* (1856), *The Book of Songs*, by J. E. Wallis (1856), the *Poems* complete by E. A. Bowring (1859), and the *Poems and Ballads* by Theodore Martin

(1879). For complete bibliography see W. Sharp's Memoir.

HEINECCIUS, *hī-nĕk'tsē-ûs*, JOHANN GOTTLIEB: 1681, Sep. 11—1741, Aug. 31; b. Eisenberg: German jurist. He studied theology at Leipsic, and law at Halle, where 1713 he was made prof. of philosophy, and 1720 prof. of law. He went as prof. of law to Franeker 1727, and to Frankfurt-on-the-Oder, 1727, but 1733 returned, as prof. of law and philosophy, to Halle, where he died. His works are of a high order: *Antiquitatum Jus Romanum Illustrantium Syntagma*, was re-edited so lately as 1841 by Mühlenbrüch; and *Elementa Juris Civilis secundum Ordinem Institutionum* (ed. by Biener, 1815); *Elementa Juris Civilis secundum Ordinem Pandectarum*, etc., are still studied by jurists. Heineccius's son, JOHANN CHRISTIAN GOTTLIEB HEINECCIUS, (1718–91, b. Halle), was long a prof. in the academy for young noblemen at Liegnitz, and edited a complete collection of his father's works (*H. Opera Omnia*, 9 vols. Geneva 1771). Heineccius's brother, JOHANN MICHAELIS HEINECCIUS (1674–1722, b. Eisenberg), was a celebrated pulpit orator in Halle, and also the first who studied seals scientifically. He is remembered by his *De Veteribus Germanorum aliarumque Nationum Sigillis* (Leip. 1710; 2d edit. 1719), and by the work edited in conjunction with Leuckfeld, *Scriptores Rerum Germanicarum* (Frankf. 1707)

HEINECKEN, *hī'nĕk-kĕn*, CHRISTIAN HEINRICH: 1721 Feb. 6—1725, June 22; b. Lübeck, Germany: remarkably precocious child. He was the son of a painter, spoke distinctly when 10 months old, had learned by heart the chief incidents in the Pentateuch when a year old, was proficient in sacred history when two, spoke French and Latin and was conversant with ancient and modern history and geography when three, and in his fourth year began studying church history and learning to write. He was invited to Copenhagen by the king of Denmark 1724, and on his return home his naturally delicate constitution gave way suddenly. His wonderful intellectual powers seem to have been well authenticated.

HEINOUS, a. *hā'nŭs* [F. *haineux*—from *haïne*, malice, hate: OF. *hadir*, to hate: OF. *haïnos*, odious]: wicked in a high degree; hateful; atrocious. HEI'NOUSLY, ad. *-lĭ*. HEI'NOUSNESS, n. *-nĕs*, wickedness; atrociousness.—SYN. of 'heinous': enormous; great; flagrant; excessive; aggravated; monstrous; odious.

HEINTZELMAN, *hīnt'sĕl-man*, SAMUEL PETER: 1805, Sep. 30—1880, May 1; b. Manheim, Lancaster co., Penn.: soldier. He graduated at the U. S. Milit. Acad. 1826, served on the n. frontier and in the Seminole Indian war in Fla., was promoted capt. at the beginning of the Mexican war, brevetted maj. for gallantry in the battle of Huamantla 1847, Oct. 9; was in the Coyote and Yuma Indian campaigns in Cal. 1849–55, promoted maj. 1855, and was on frontier duty on the Rio Grande, in Tex., till the beginning of the civil war. In 1861, May, he was brevetted

lieut.col., promoted col. 17th U.S. inf. and appointed brig.gen. of vols., and captured Alexandria, Va. He was wounded in the first battle of Bull Run; commanded the 2d army corps in the peninsular campaign, before Yorktown, and in the battle of Williamsburg; promoted maj.-gen. vols. 1862, May 5; commanded the 3d and 4th corps at Fair Oaks and in the seven days' fighting before Richmond, and the 22d corps at Chancellorsville and Gettysburg; commanded milit. depts. till close of war; and was mustered out of the vol. service 1865, Aug. He was brevetted brig. and maj.gen. U. S. A., and placed on the retired list as full maj.gen. by special act of congress 1869, Feb. 22.

HEIR, n. *ār* [L. *hærēs;* OF. *heir* and *hoir*, an heir: comp Gael. *oighre*, an heir—from *og*, young]: one who is entitled to anything after its present possessor: V. to inherit. HEIR'ESS, fem. of *heir:* a female who is heir when there are no male heirs. Where there are several females, all sisters, who are in that case equally entitled, they are sometimes called co-heiresses, but more properly *coparceners*, and in Scotland *heirs-portioners*. In *heraldry*, a woman is accounted an heiress if she has no brothers who leave issue. The husband of an heiress is entitled to bear her arms in an escutcheon of pretense, i.e., a small escutcheon in the centre of his paternal shield, and the children of an heiress may quarter her arms with their paternal coat. Neither practice is of very early introduction in heraldry. (See MARSHALLING OF ARMS.) HEIR'LESS, a. destitute of an heir. HEIR'SHIP, n. state or right of an heir. HEIRSHIP-MOVABLES, see HEIRLOOM. HEIR-APPARENT, one who has unqualified right to the inheritance if he outlive the possessor. HEIR-PRESUMPTIVE, one who stands nearest in succession in default of an heir-apparent, i.e., one who may ultimately be displaced by a later-born child. HEIRS-PORTIONERS, in *Scotch law*, either two or more females, being sisters, or sisters and the children, male and female, of deceased sisters, who are entitled to succeed to heritable estate. HEIR-AT-LAW, one who succeeds to an estate by common law when there is no will, or near relative of deceased. See SUCCESSION. *Note.*—A man's son or daughter is *heir-apparent*, but when he has no son or daughter, then his brother or cousin, etc., is *heir-presumptive.*

HEIR, *ār:* at common law, a person who by right of birth succeeds to the real estate of his ancestor immediately after the latter's death; in civil law, a person who succeeds to the rights and occupies the place of a deceased person. In practice the word is not used as applying to personal estate, for this kind of property usually is distributed by an administrator or executor among the next of kin, while real property passes direct to the heir upon the death of the ancestor without any formality of transfer. In some states, however, the civil law authorizes the heir to administer both the personal and the real estates. A further difference between the common and the civil laws is seen

in local statutes which designate by heir all persons who are called to the succession, whether by the act of the ancestor or by the operation of law. While the English law recognizes the eldest son and his descendants as first claimants to property, and where there are only daughters gives each an equal share, the laws of the United States express no preference for one child above all others. Unless otherwise provided by will of the ancestor or by law of the state, all children have an equal right to the inheritance. Some states have statutes prohibiting a testator with natural heirs devising more than half of his property to charitable corporations; others have established a line of descent, specifying the relatives by blood and marriage who may inherit and their respective order. No person is legally the heir of a living person. An *Heir-apparent or Heir-presumptive* is the person who will become the heir on the death of the ancestor; *Heir-collateral*, one beyond the direct line of inheritance, as brother, sister, nephew, niece, etc.; *Heir-conventional*, one who succeeds in consequence of a contract, like that of marriage, *Heir-irregular*, one who has no testamentary nor legal right of succession, but who succeeds by virtue of an award of court; *Heir-testamentary*, one who becomes heir by a legally-executed will; *Heir-legal*, one of the same blood, to whom the law gives the succession without qualification, such as (1) children and other lawful descendants; (2) fathers and mothers and other lawful ascendants; (3) collateral kindred: and an *Heir-beneficiary*, one who accepts succession under the benefit of an inventory which relieves him of responsibility for debts beyond the value of the inheritance. In the United States all property of an heirless intestate goes to the state.

HEIR'LOOM [A. S. *geloma*, goods], in Law: certain chattels which go to the heir-at-law by special custom, and have already come through several descents. The chattels included are the best of everything, as pots, pans, tables, etc. But the right is obscure. The word is more frequently used now to designate some chattel which a testator has bequeathed to the person, whoever he may be, who is to take the real estate. In Scotland, a somewhat similar, but by no means identical, phrase is used—viz., *heirship movables*, which is a wider right, and includes the best articles of furniture in the house of a person who left heritable property. The extent of this right also is not clearly settled.

HEISS, *hīss*, MICHAEL, D.D.: 1818, Apr. 12—1890, Mar. 16; b. Bavaria: Rom. Cath. archbishop. He studied law and theol. in the Univ. of Munich and the Theol. Seminary in Eichstadt; was ordained priest 1840, Oct. 18; came to the United States 1842, engaged in missionary work and became sec. to Bishop Henni in Milwaukee, built the first Rom. Cath. parochial church and the first brick church edifice in Milwaukee, was appointed first rector of the Seminary of St. Francis de Sales, and consecrated bp. of La Crosse 1868, Sep. 6. He had charge of this diocese 12 years; was nominated coadjutor to Abp. Henni of

Milwaukee, with right of succession, 1880, Mar. 14; and became metropolitan of the archdiocese 1881, Sep. He was theologian in the Baltimore council 1849, St. Louis 1855, and Baltimore (plenary) 1866, and an active member of the Vatican council 1869–70.

HEL, *hĕl:* in Norse mythology, the goddess of the dead, who dwelt beneath one of the three roots of the sacred ash Yggdrasil. She was the daughter of the evil-hearted Lok, by the giantess Angurboda. Hel (with her brothers, the wolf Fenrir and the serpent Jormundgand) was bred up in the giant's home of Jötunheim, where she remained, till at the request of the Æsir, or gods, the All-father sent for her and her brothers; when, knowing that by their origin these children must prove a great source of calamity, he resolved upon their destruction, and after casting the serpent into the deep ocean, which surrounds all lands, and where it has grown so that it encircles the whole world, and bites its own tail, he hurled Hel into Niflheim over which he gave her authority, and in which she was to assign places to all who died of sickness and age. Her dwelling is *Elindnir,* dark clouds: her dish, *Hungr,* hunger; her knife, *Sullt,* starvation; her servants, *Ganglâti,* slow-moving; her bed, *Kör,* sickness; and her curtains, *Blikiandaböl,* splendid misery. She is easily recognized by her fierce aspect and her half-black, half flesh-colored skin. Hel was inexorable, and would release no one who had once entered her domain. (See Balder). After the introduction and diffusion of Christianity, the ideas personified in Hel gradually merged, among all the races of northern and German descent, in the local conception of a hell (q.v.; see also Hades) or dark abode of the dead; though belief in the goddess Hel is not entirely extinct among the ignorant.

HELAMYS, n. *hē'la-mĭs* [Gr. *hellos,* a fawn; *mus,* a mouse]: the jumping hare or jumping mouse, genus of rodent animals allied to the jerboas. It is about the size of a hare and advances by leaps and bounds, sometimes jumping 20 or 30 ft. at a bound. It damages the green and ripe grain crops adjacent to the mountains where it lives. It is called also Pedetes.

HELARCTOS, n. *hĕl-ârk'tŏs* [Gr. *hēlios,* the sun; *arktos,* a bear]: sunbear; genus of *Ursidæ* (bears). They have smooth glossy hair, feed chiefly on honey or the young shoots of the cocoanut tree, and are milder in their disposition than the more typical members of the family.

HELCOLOGY, n. *hĕl-kŏl'o-jĭ* [Gr. *helkos,* a wound, an ulcer; *logos,* discourse]: the branch of medical science which treats of ulcers.

HELCOPLASTY, n. *hĕl-ko-plăs'tĭ* [Gr. *helkos,* a wound, an ulcer; *plastos,* formed, molded]: in *surg.,* the process of replacing the epidermic integument, destroyed by an ulcer, by transferring to the injured spot a piece of skin from another part of the same person or of some other person.

HELD, v. *hĕld:* pt. or pp. of Hold, which see.

HELDER, *hĕl'dẽr:* thriving seaport and strongly fortified town, province of Holland, Netherlands; on the *Marsdiep*, which unites the Zuider Zee and the German Ocean, and separates N. Holland from Texel. It is 45 m. n.n.w. of Amsterdam, with which it is connected by the Grand Ship Canal: see AMSTERDAM. Helder is protected from the inroads of the sea by an enormous dike, six m. in length, 40 ft. broad at the top, on which there is a good road, and which presents to the sea a sloping side of 200 ft. inclined at an angle of 40°. This dike is built entirely of huge blocks of Norwegian granite. Here alone, along the whole coast, is deep water found close to the shore, a fact accounted for by the rush or 'race' of the tide, whose violence allows no sand to accumulate. Fort Kykduin is surmounted by a tower and light-house. The harbor, well sheltered by the dike, can easily contain 300 large vessels Pop. (1900) 26,075.

HELE, or HELL, v. *hēl* [AS. *hélan*, to conceal]: in *old* and *prov. Eng.*, to cover; to conceal; to hide. HEL'ING, imp. HELED, pp. *hēld*. HELLIER, n. *hĕl'ĭ-ẽr*, in *OE.*, a coverer of houses; a thatcher or tiler; a slater.

HELEN, *hĕl'ẽn*, or HELENA, *hĕl'ẽn-a*, in Greek Legend daughter of Zeus and of Leda, wife of Tyndareus, King of Sparta. According to the ancient legend, she was so exceedingly beautiful, that at the age of ten she was carried off by Theseus and Pirithous, but was recovered subsequently by her brothers, Castor and Pollux. Tyndareus afterward engaged her suitors, who numbered about 30, by a solemn oath, to unite together to aid the husband whom Helen should choose, in case of any attempts being again made to carry her off. In accordance with this oath, her husband, Menelaus when she was afterward carried off by Paris, son of Priam, King of Troy, summoned all the princes of Greece to avenge his injury, and thus gave rise to the Trojan war. The stories concerning the fate of Helen are inexhaustible. The ordinary legend states that after the death of Paris she voluntarily married his brother Deiphobus, and that on the taking of Troy, in order to recover the favor of Menelaus, she betrayed Deiphobus into his hands. On the fall of Troy, she returned with Menelaus to Sparta, but after his death was driven from the country, and, having gone to Rhodes, was there murdered by the queen of the island. By her husband Menelaus, she had one daughter, Hermione. In the Homeric poems, Helen appears as one compelled by the gods to take a course for which she has no liking; thus she is held in some sense apart from the wrong that she does. The Helen of Greek legend appears to have been developed from a more ancient Helen who was worshipped as a moon-goddess.

HELENA, *hĕl-ē'na* or *hĕl'ĕna:* Ark., city and county-seat of Phillips co., on the Mississippi river and on the Arkansas Midland, the Arkansas Central, the St. Louis, Iron Mountain and Southern, and the Yazoo and Mississippi Valley railroads, 80 m. s. of Memphis. The trading

centre of a lumber and cotton-growing region, it has lumber mills and yards, cotton-seed oil and compress mills, etc., banks, churches, graded schools, public library, and co. court-house. Helena was the scene of a confederate defeat and repulse 1863, July 4. Pop. (1910) 8,772.

HELENA: city, cap. of Mont. and of Lewis and Clarke co.; on the N. Pacific, and the Great Northern railroads, midway between the Rocky Mts. and the Missouri river; 100 m. s.w. of Fort Benton. The city is surrounded on all sides by the Rocky Mts.; on the south and west the mountains are within two miles of the city, while to the north there is a wide valley between the city and the foothills, and the same condition exists on the east. The country tributary to the city is rich in both mineral and agricultural resources. The mines are principally gold-producing, while the products of the farms are cereals and the ordinary vegetables. Tributary to the city are large areas devoted to the raising of cattle and horses, but this industry is gradually being replaced by diversified farming.

The geographical situation of Helena has made it a great distributing centre. The Northern Pacific Railroad, the first to reach the city, following the trend of business, built branch lines from Helena, and thus it retained its commercial supremacy. Later the Great Northern was also extended to the capital city, and it likewise reached out for trade in the surrounding country by building branches. The original of Helena was 'Last Chance Gulch;' the town came into existence as a result of discoveries of placer gold. The first discovery of gold was made in 1864, by four prospectors, John S. Cowan, John Crab, D. J. Miller, and Robert Stanley. These four men found what is now known as Prickly Pear Creek, running through the valley north of Helena, and here they discovered a few traces of gold, but they continued their journey north. Provisions becoming scarce they retraced their steps. intending to return to Virginia City, and again they came to Prickly Pear Creek where they noticed a little gulch. On July 16 they sunk two holes to bedrock, and in each they found gold. It was the 'last chance' that turned out favorable, and that was the name of the camp until October 30 of the same year when it was named Helena.

In the 20 years after the opening of the 'Last Chance Gulch,' gold to the amount of $25,000,000 was taken out of the gulch and the town grew to a city of 20,000 and became the capital of the state.

From the discovery of gold until 1881, Feb. 22, when the city government was organized under a charter from the state government, the government of the city was by a committee representing the merchants and bankers.

The government is now vested in a mayor, who holds office two years, and a council. The executive appoints, subject to the approval of the council, all the subordinate officials except the city treasurer and police magistrate, both of whom are chosen at a popular election. The assessed valuation of property is about $13,000,000.

The educational institutions are public and parish schools, the Montana Wesleyan Univ. (M. E.), opened in 1890, Saint Vincent's Academy, and the State, city, and other libraries. Among the principal buildings at Helena are the Government building, costing $500,000; State capitol, costing $400,000; the county court-house, costing $100,000; the high school building, costing $150,000, and seven graded school buildings valued at $200,000. There are also Saint John's Hospital, Saint Joseph's Orphanage, and several fine churches. Twelve miles from Helena, on the Missouri River, is located the plant of the Missouri River Power Company. This company furnishes electrical power for operating street cars and lighting the city of Helena, and for manufacturing purposes. It also transmits electrical power to Butte for use in the mines, a distance of 100 miles. Four miles from Helena is located the smelter of the American Smelting and Refining Company. The principal gold mine now operated in the vincinity of Helena is the Big Indian, located in a gulch four miles south of the city. Marysville is the largest mining camp tributary to the city. Here is located the Drum Lummon mine, owned by an English company, and in the near vicinity are other mines which are large gold producers. Helena became capital of the state in 1894. Pop. 10,770.

HELENA, (Ark.) Battle of: since 1862, July 13, it had been occupied by Union troops, in all 4,129 effective men, under command of Gen. B. M. Prentiss. The place is surrounded by hills, and those nearest the city were occupied by strong redoubts; Graveyard Hill in the centre, Fort Righter on the north or right, and Fort Hindman on the south or left, were all connected by a line of bastions and rifle-pits, both ends of which rested on the river. In the river lay a gunboat. Toward the middle of June the Confederates determined to take the place, whereby it was hoped to raise the siege of Vicksburg. Gen. Holmes was ordered to move from Little Rock with about 7,600 men, Price's and Marmaduke's divisions, Fagan's brigade of infantry, and Walker's brigade of cavalry. Holmes bivouacked about four miles from Helena on the evening of July 3. The assault was ordered at daylight. On the Confederate right Fagan with 1,770 men advanced on Fort Hindman, carried all the outer entrenchments, and made a desperate attempt to take the fort, but was repulsed with a loss of over 400 men. On the Confederate left, Marmaduke's division of infantry and Walker's cavalry brigade, aggregating 2,780 men, attacked Fort Righter and were repulsed. Price, in the centre, with 3,100 men, made a strong assault, carried all the entrenchments in his front, seized Graveyard Hill, and ordered one brigade to move on the town and another to assault Fort Hindman in the rear, but the Union troops checked the advance of the two brigades and drove them back and, the attacks on the right and left being repulsed, the fire of the forts, rifle-pits, and gunboat was concentrated on Price, and at 10.30 A.M. Holmes gave the order to withdraw, and led

his troops back to Little Rock. The Union loss was 57 killed, 146 wounded, and 36 missing; the Confederate loss was 173 killed, 687 wounded, and 776 missing.

HELE'NA, St.: island in the Altantic; lat. 15° 55′ s., long. 5° 44′ w.; greatest length 10½ m., breadth 7 m.; 47 sq. m.; 850 m. from the nearest land, Ascension Island; nearly 1,000 m. w. from the nearest point of the African continent. It was discovered 1501, May 21 (St. Helena's Day), by the Portuguese navigator Juan de Nova Castella; afterward became a Dutch possession; was ceded by Holland about the middle of the 17th c. to the English E. India Company; and by it made over to the British crown 1833. Its chief value was as a halting-place on the homeward voyage from India. Its loneliness and inaccessibility led to its being selected for the residence of Napoleon Bonaparte, who lived there in captivity 1815–21. It has one good inlet and harbor, James's Bay, and one town of note, James's Town. The coast has naturally scarped faces of cliff 600–1,200 ft. high, and the mouths of ravines are protected by forts. About 6,000 acres—one-fifth the entire surface—are cultivable, but not more than 500 are under tillage. There are several plains on the island, the largest of which is Longwood, where stands the house in which Napoleon lived. Supplies of provisions, properly so called, are mostly imported. Pop. 4,116.

HEL'ENA, Saint: empress, wife of Constantius Chlorus, and mother of Constantine the Great: b., according to one account, in Bithynia; but the English Church historians commonly claim her as a native of Britain, which opinion has some probability from the fact that her first-born son, Emperor Constantine, was born in Britain. She died 328 (or 326). She became a Christian during the youth of Constantine, and it is thought not unlikely that her example and her teaching co-operated with public motives in determining him to embrace the Christian religion. It was not, however, till after the defeat of Maxentius that Helena, far advanced in years, formally received baptism. She was zealous for the advancement of religion, and was canonized for acts of piety and munificence. Rom. Cath. historians record her discovery of the holy sepulchre, and of the cross of the Lord Jesus. Two other royal or princely ladies named Helena are honored as saints: the first, in high repute in the Russian Church, was the wife of the Grand Duke Igor, and, at her baptism in Constantinople (955), changed her original name, Olga, into Helena; the other, of the 12th c., was a native of Skofde, West Gothland.

HELENINE, n. *hĕl'ĕ-nĭn* [L. *helĕnĭŭm*, the plant elecampane—so called because supposed to have sprung from the tears of Helen]: a substance like camphor, obtained from the plant elecampane.

HELIACAL, a. *hĕ-lī'ă-kăl* [Gr. *helĭăkŏs*, belonging to the sun—from *hēlĭŏs*, the sun]: emerging from the light of the sun, or passing into it, as a star or planet. Heli'acally, ad. *-lĭ*. Heliacal rising, rising of a star, just before the

sun. When the sun approaches a star near the ecliptic, the star becomes for a season invisible—the heavens being too bright in the quarters of sunrise and sunset, at the times of its rising and setting, to allow it to be seen. But when the sun, advancing in its orbit, separates from the star, and the latter begins to rise first, it in time rises so much earlier than the sun, as to be visible before daylight. HELIANTHUS, n. *hĕl'ĭ-ăn'thŭs* [Gr. *anthos, a flower*]: a genus of plants of several species, one of which is the well-known sun-flower (see JERUSALEM ARTICHOKE; SUNFLOWER). HEL'IANTHOI'DA, n. *-thoy'dă* [Gr. *anthos*, a flower; *eidos*, form, shape]: an order of polyps, resembling a sunflower in appearance, of which the actiniæ or sea-anemones may be taken as the type.

HELICAL, a. *hĕl'ĭ-kăl* [Gr. *helix* or *helĭka*, a winding, a spiral body]: winding. HEL'ICALLY, ad. *-lĭ:* HEL'ISPHER'IC, a. *-sfĕr'ĭk* [Gr. *sphaira*, a globe or ball]: spiral or winding; also HEL'ISPHER'ICAL, a. *-ĭ'kăl*. HELICIDÆ, n. plu. *hĕ-lĭs'ĭ-dē*, large family of gasteropodous mollusks, of the order *Pulmonata*, and of which snails (q.v.) are familiar examples. The order is distinguished by having part of the mantle cavity formed into an air-sac or lung. The Helicidæ are land mollusks. They have a spiral shell, into which the body of the animal can be withdrawn. Most of the species resemble the common snails in their habits, feeding on vegetables substances of various kinds, and often giving trouble to the farmer and gardener. HEL'IOC'ERAS, n. *ĭ-ŏs'ĕr-ăs*, or HEL'IOCOR'ATITE, n. *ō-sĕr'ă-tīt* [Gr. *keras*, a horn]: a genus of the ammonite family—so named from the spiral arrangement of its chambered whorls. HEL'ICOID, n. *-kŏyd* [Gr. *eidos*, form]: a peculiar curve or spiral. HEL'ICOI-DAL, a. *-kŏy'dăl*, in *bot.*, having a coiled appearance like the shell of a snail—applied to inflorescence. HELIX, n. *hĕl'ĭks*, HEL'ICES, n. plu. *-ĭ-sēz*, something that is spiral; the external body of the ear; the snail-shell; in *arch.*, a flight of steps winding spirally around a cylindrical space or centre-post. The delicate volute, like the tendril of a vine, which curls over the leaves, and just beneath the abacus, of a Corinthian capital. HEL'ICITE, n. *-ĭ'sīt*, in *geol.*, any fossil shell of the helix family.

HELICINE, a. *hĕl'ĭ-sĭn* [Gr. *helix*, the tendril of the vine or that of ivy]: of, belonging to, or resembling a tendril; not confined to botanical descriptions, for in anatomy there are helicine arteries.

HELICON, n. *hĕl'ĭ-kŏn:* mountain, or rather mountain-range in the s.w. of the province of Bœotia, in Greece; continuation of the range of Parnassus. It was celebrated by ancient poets as the favorite seat of the Muses. The loftiest summit (now called Paleovúvi) is about 5,000 ft. high. At the bottom of Helicon stood the village of Ascra the residence of Hesiod, and the seat of the earliest school of poetry in Greece. In ascending the mountain from Ascra (now Pyrgáki), the traveller passes the famous fountain of Agnippe, the waters of which were fabled to bestow

inspiration. The Grove of the Muses is supposed to have been situated in a hollow at the foot of Mount Mirandáli, one of the summits of Helicon. Leake considers that its site is now occupied by the church and convent of St. Nicholas. Twenty stadia above this was the fountain of Hippocrene, probably the modern Makariotissa, where there is still a fine spring.

HELIGOLAND, *hĕl'ĭ-gō-lând* (Ger, *Helgoland;* native neme, *Hellige Land*, 'Holy Land'): island in the North Saa, about 40 m. n.w. of the mouth of the Elbe, lat. 54° 11′ n., and long. 7° 51′ e. It is about a mile long from n. to s., and one-third of a mile e. to w., and one-fifth of a sq.m. in area. The *Oberland* is a rock 200 ft. in height, on which stands a town of 350 houses; while the *Unterland* is a patch of shore with 70 houses s.e. of the cliff, and communicating with it by a flight of 196 steps. Pop. about 2,000; though in the bathing season Heligoland is visited by about 2,000 summer visitors, mainly Hamburgers, attracted by the admirable bathing facilities offered by the 'Sand Island' or *Dune*, a small sandbank covered with scrubby vegetation, and separated from the main island by a channel about a quarter of a mile wide. The Sand Island was formerly connected with the other by land, but the inroads of the sea, 1720, isolated it, and are steadily reducing its size. The soil on the flat top of the rock of Heligoland suffices for a little pasture land, a few potato patches and cabbage gardens. There are some sheep on the island, but no horses; one or two cows are brought in summer. Wheelbarrows are the only wheeled vehicles. The spit of the Unterland, on which are two or three trees, gives partial shelter to two harbors, one to the north, the other to the south. The inhabitants are supported chiefly by fishing, by serving as pilots, and by the summer visitors. A lighthouse stands on the cliff near the village. The island, taken by the English from the Danes 1807, and formally ceded to England 1814, has an English governor, but the internal affairs are managed by a council of the islanders. There is an annual sitting of an island parliament, at which every householder may speak. The laws are the old Frisian code. Frisian is the native tongue, but German is currently spoken. The place was once regarded as of great military importance, and was fortified with four batteries. These are not now however, maintained in efficiency, nor is there any garrison. Steamboats ply between Heligoland and Hamburg. Heligoland was anciently sacred to the goddess Hertha. According to tradition, for which, however, no historic proof is available, Heligoland was once vastly larger, great tracts of country having been swallowed up by the sea between A.D. 700 and the end of the 17th c. Christianity was preached here first by St. Willibrod, 7th c., after whose time the island received its present name. The inhabitants of Heligoland are divided into two classes, fishermen and merchants. The first are Frisians, simple and primitive in habits, and holding land-labor in contempt; and the merchant class consists of immigrants from the German

mainland and their descendants. Heligoland was officially transferred by Great Britain to Germany 1890, Aug. 9, in accordance with the Anglo-German agreement concerning the division of territory in Africa (q.v.).

HELIOCENTRIC, a. *hē′lĭ-ō-sĕn′trĭk* [Gr. *hēlĭŏs*, the sun; *kentron*, centre]: concentric with the sun; having the sun as the centre; opposed to *geocentric*, which takes the earth as the centre of reference or view. In modern astronomy the word is applied to calculations in which the sun is referred to as centre of the planetary system. Thus the heliocentric place of a planet is the position it would occupy at a given time when calculated from a point of view in the centre of the sun. HE′LIOCEN′TRICAL, a. *-trĭ-kăl*. HE′LIOCEN′TRICALLY, ad. *-lĭ*.

HELIOCHROME, n. *hē′lĭ-o-krōm* [Gr. *hēlios*, the sun; *chrōma*, color]: name given by Niépce de St. Victor to the products of his process for photographing in the natural colors; a photograph in colors.

HELIODORUS, *hē-lĭ-o-dō′rŭs:* earliest and best of the Greek romance writers: b. at Emesa, in Syria; son of Theodosius. The church historian Socrates says he became a Christian, and was Bp. of Trikka, in Thessaly, about the end of the 4th c. Some scholars now deem it more probable that the romance writer was a Neo-Pythagorean sophist of the 3d c. The work by which he is known is entitled *Æthiopica*, the oldest work of the kind extant. It extends to ten books, and narrates in poetic prose, at times with almost epic beauty and simplicity, the loves of Theagenes and Charicleia. The work, though full of improbable scenes and incidents, is distinguished from the later Greek romances by its vigor. See Rohde, *Der Griechische Roman* (1876). There are editions by Korais (1805), Bekkar (1855), and Hirschig (1856).

HELIOGAB′ALUS. See ELAGABALUS.

HELIOGRAPH, n. *hē′lĭ-ō-grăf* [Gr. *hēlĭŏs*, the sun; *graphō*, I describe or paint]: an instrument devised for obtaining photographs of the sun; a sun telegraph; a photograph (see HELIOTROPE—HELIOSTAT—HELIOGRAPH). HE′LIOG′RAPHY, n. *-ŏg′ră-fĭ*, a description of the sun; the art of fixing images of objects by means of photography. HE′LIOGRAPH′IC, a. *-ō-grăf′ĭk*, pertaining to. HE′LIOG′RAPHER, n. *-ŏg′ră-fẽr*, one who.

HELIOLATRY, n. *hē′lĭ-ŏl′ă-trĭ* [Gr. *hēlĭŏs*, the sun; *altreio*, I worship]: worship of the sun. HE′LIOL′ATER, n. *-tẽr*, one who worships the sun.

HELIOLITES, n. plu. *hē′lĭ-ō-lītz* [Gr. *hēlĭŏs*, the sun; *lithos*, a stone]: an extensive genus of fossil corals—so called from the sun-like aspect of the septa of their pores.

HELIOMETER, n. *hē′lĭ-ŏm′ĕ-tẽr* [Gr. *hēlĭŏs*, the sun; *metron*, a measure]: instrument invented by Bouguer 1747, by means of which the diameters of the heavenly bodies can be measured with great accuracy; called also an *astrometer*.

As improved by Dolland, the object-lens of the instrument is in two halves, each of which will form a perfect image in the focus of the eye-piece; and the images may be made to diverge, coincide, or overlap each other, by varying the distances between the half-lenses. If the diameter of the sun is to be measured, the two lenses are adjusted so that the images may touch each other, then the distances between the centres of the two object-glasses measured in seconds gives the diameter of the sun.

HELIOPOLIS, *hē-lĭ-ŏp′o-lĭs* (*City of the Sun*): Greek name of the city called by the Egyptians On, on the east side of the Pelusiac branch of the Nile, near the apex of the Delta; one of the most ancient and important Egyptian cities. Here were the headquarters of the wisdom of the Egyptians. From the priests of Heliopolis, Solon Thales, and Plato are reported to have learnt. Manethon, the historiographer of Egypt, was chief-priest of Heliopolis, an office filled centuries earlier by the father-in-law of the Hebrew Joseph. The ruins of Heliopolis still cover an area nearly three m. square. One of the red granite obelisks long famous as Pharaoh's needles, is still standing near the hamlet of Matarieh. There is reason to suppose that the obelisk called 'Cleopatra's needle,' lately taken to England, had originally been brought to Alexandria from Heliopolis.

HELIOP′OLIS SYR′IÆ. See Baalbek.

HELIOS, *hē′lĭ-os:* Greek name of the sun (Roman *Sol*), worshipped as a god. He was, according to Homer, son of the Titan Hyperion, and of Theia or Euryphaëssa, and is described by the same poet as giving light to both gods and to men. He rises in the e. from the marshy borders of Oceanus, into whose dark abysses in the w. he also sinks at evening. The later poets, however, gave him a splendid palace in the east, somewhere below Colchis, and describe him as being conveyed, after the termination of the burning labors of the day, in a winged boat of gold, along the n. coast of the sea back to Colchis. After the time of Æschylus, he began to be identified with Apollo or Phœbus, but the identification was never fully carried out. His worship was widely spread. He had temples in Corinth, Argos, Trœzene, Elis, and many other cities, but his principal seat was Rhodes, where a four-team was annually sacrificed to him. In addition, it was customary to offer white lambs or boars on his altars. The animals sacred to him were horses, wolves, cocks, and eagles. Sculpture represents him, usually, riding in his chariot, drawn by four horses.

HELIOSCENE, n. *hē′lĭ′ō-sēn* [Gr. *hēlĭŏs*, the sun: L. *scēna;* Gr. *skēnē*, the scenes of a theatre]: a sun blind or screen placed over a window outside to prevent the sun's rays from unduly heating the glass.

HELIOSCOPE, n. *hē′lĭ-ō-skōp* [Gr. *hēlĭŏs*, the sun; *skŏpĕō*, I view]: a telescope fitted for solar observations. He′lioscop′ic, a. *-skŏp′ĭk*, pertaining to. The helioscope is a telescope behind which the image of the sun is received

upon a plane surface. An astronomical telescope is drawn out a little farther than is necessary for common use, and directed toward the sun, and the image which is formed is received in a dark place. For this purpose a dark chamber is employed, or the telescope is placed in a dark funnel-shaped enclosure, the bottom of which is covered with oiled paper or closed with ground glass, on which the sun's image is formed. Upon the paper or glass a circle is described equal to the image, and it may be divided by concentric circles into rings. With this instrument the spots on the sun, eclipses, etc., may be observed.

HELIOSTAT, *hē′lĭ-ō-stăt*, an instrument used in optical experiments with sunlight for keeping a beam always falling in the same direction in spite of the motion of the sun. It consists of a mirror mounted equatorially, and carried round by clock-work in such a way as to neutralize the apparent motion of a beam of sunlight reflected from it. This instrument has been employed among other purposes as a means of signaling. A beam of light being directed to the point to which it is intended to convey the signals, the dot-and-dash alphabet is made use of by the device of exhibiting and obstructing the light for longer or shorter periods. A short flash represents one letter, a long flash another, a short quickly followed by a long a third, and so on. As adapted to this purpose the heliostat has received the name of heliograph.

HELIOTROPE, n. *hē′lĭ-ō-trōp* [Gr. *hēlĭŏs*, the sun; *trŏpē*, a turning]: that which turns toward the sun; an anc. instrument for showing the time of the sun's arrival at the tropics or equinoctial line (for another instrument, see below): a popular garden and window flowering plant; the turnsole or sunflower, of the genus *Hēlĭōtrōpĭŭm* (see below): a mineral of a deep green; blood stone (see below): He′liotrop′ic, a. *-trŏp′ĭk*, having the property of always turning its leaves and flowers toward the sun. He′liot′ropism, n. *-ŏt′rō-pĭzm*, movements of leaves or flowers toward the sun. Heliotropic curvatures, the movements which certain plants, like the sun-flower, perform under the influence of the sun; the periodical movements of organs, etc., in plants.

HELIOTROPE, *hē′lĭ-o-trōp* (*Heliotropium*): genus of plants of the nat. ord. *Borragineæ* (q.v.); of the section, sometimes made a distinct order, *Ehretiaceæ*, the fruit separating only when ripe into four carpels. Many of the species have fragrant flowers. The Peruvian Heliotrope (*H. Peruvianum*), a small shrub, seldom more than two ft. high, with oblong-lanceolate leaves, and small lilac-blue flowers, is in almost universal cultivation for its fragrance, which resembles that of vanilla. The European or Common Heliotrope (*H. Europæum*), native of s. and w. Europe, is an annual with small white, or rarely pale red, flowers. Important healing powers were once erroneously ascribed to it in cases of cancerous and scrofulous sores; it is, however, astringent and mucilaginous. Many hybrid heliotropes are seen in flower-gardens and green-

houses. They delight in a rich, light soil. The shrubby kinds are generally propagated by cuttings. Large quantities of the flowers are used by perfumers for making scents. Classical fable accounts for the name Heliotrope [Gr. *helios*, the sun, *trŏpē*, a turning], by representing Clytia as turned into this flower through gazing at Apollo.

HE′LIOTROPE, or Bloodstone: variety of chalcedony or of jasper, of green color with red spots. The finest heliotropes consist of chalcedony, and are translucent, at least at the edges; the jasper bloodstones are opaque. Heliotrope is found in many parts of the world, but the finest specimens are from s. Asia. It was well known to the ancients, who obtained it chiefly from Ethiopia and Cyprus. It is much used for boxes, seals, etc.: and those specimens are most valued in which the ground color is beautiful, and the spots bright and well distributed. It was often used in the early ages of the Christian Church for the engraving of sacred subjects, the figures being so managed that the red spots should represent drops of blood. Different accounts are given of the origin of the name Heliotrope.

HE′LIOTROPE—HELIOSTAT, *hē′lĭ-ŏ-stăt*—HELIOGRAPH, *hē′lĭ-o-grăf:* instruments used by surveyors for rendering distant stations distinctly visible. This is managed by placing a mirror at the distant station, and adjusting it so that a particular hour of the day (arranged beforehand,) the light of the sun shall be reflected from the mirror directly to the surveyor's station. The surveyor must make his observation almost at the instant he sees the glancing of the mirror, as the constant change of the sun's position in the heavens produces a corresponding change in the direction of the rays reflected by the mirror. Gauss (q.v.), invented such an instrument about 1821, used especially in America, for geodetic surveys. Of late, instruments of this kind, called heliotrope, heliostat, or heliograph, have been so perfectly contrived as to be available at a distance of more than 190 m. (in California). French engineers in Algeria have found the signals serviceable 170 m. Recently there has been great development in heliography, or sun-telegraphy, for signalling messages between the sections of an army in the field, as during the British campaign in Afghanistan 1880. Drummond's and Begbie's heliostat, and the heliographs (differing in details) of Mance and Anderson, are favorable known. The name heliostat was originally used of an Equatorial (q.v.) revolving on its polar axis.

HELIOTROPISM, *hē-lĭ-ŏt′rō-pĭzm*, or Phototropism, the influence and effect of sunlight on organisms. When a seedling plant is placed in a transparent vessel of water within reach of the light of a window, the stem and leaves gradually bend toward, and the roots from, the light, The former phenomenon is termed positive, and the latter negative, heliotropism. The shoots and leaves of nearly all plants turn toward the light, and the turning of the

sunflower toward the sun is familiar to every one. In the case of organs which are positively heliotropic the growth of the sight next the light is retarded, and that of the opposite side increased; the result of these combined actions is a concavity on the former, and a convexity on the latter, thus causing a curvature toward the light. In the case of roots these actions are reversed. That these results are brought about by the action of light is evident; the cells on the concave side become less, while those on the convex side become more, turgid, thus forcing the organ to bend; but the cause of turgescence is unknown.

In animals a similar heliotropism is operative and is plainly manifested in some low forms, as hydra, where it is of great service in their almost automatic food-getting. Heliotropism is closely allied to, and much modified by chemotropism and other influences.

HELIOTYPE, n. *hē′lĭ-ō-tīp* [Gr. *hēlĭŏs*, the sun; *tupos*, type, form]: a sun-picture or photograph.

HELIOTYPOGRAPHY, *hē-lĭ-o-tī-pŏg′ra-fĭ* (otherwise *Photoheliography*): art or process of photographic representation of the sun's disk. Mr. De la Rue, in the Observatory of Kew, near London, has produced, on sheets of paper, pictures in which the solar spots are represented without the aid of drawing or engraving of any kind. In one form of operation (noticed in *Proceedings* of the Royal Astronomical Society), the sun's spots were viewed through a Newtonian reflector of 18-inch diameter, and 10 ft. focal length, producing an image that would have made the sun's disk three ft. diameter. By a nice adjustment, the image of a portion of the disk was received on a glass-plate rendered sensitive by collodion. The first part of the process was then complete—the sun painting a picture of its own spots on a piece of glass. Then came the transfer of this negative to a positive, by the usual photographic means of printing, but with a varnish of very complex chemical nature on the positive plate. This completed the second stage—photography producing a very faint picture on the positive plate. Then came chemistry: by dissolving away certain constituents of the varnish, which had been more affected than the rest by the actinic force of the sun's light, the surface of the positive plate became a series of ridges and hollows, *relievi* and *intaglie*, extremely minute in their differences of level, but still sufficiently marked to convey the notion of a kind of engraving. Next came electrotype or galvanography. The plate, in the state thus described, served as a matrix or foundation on which an electrotype cast could be taken. By Pretsch's process, this cast may be so varied as to be available either for surface-printing or for printing on the copper-plate plan. Other solar phenomena, such as the corona, and the appearance presented during annular and total eclipses, have been reproduced in a similar way. See Galvanism; Photographic Engraving; Photography.

HELISPHERIC, etc. See under Helical.

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